REQUEST FOR PROPOSALS

Filbert Orchard Management Services at Dorris Ranch

October 30, 2019
Procurement Information Summary Page
This page of information is provided for convenience only. Refer to the full RFP for complete details.

ABBREVIATED SCHEDULE
RFP Issue Date      October 30, 2019
Solicitation Protest Deadline     November 22, 2019 by 5 p.m.
Proposal Due Date       December 5, 2019 by 2 p.m.
Notice of Intent to Award Contract     December 19, 2019
Selection Protest Deadline       December 26, 2019 by 5 p.m.

WILLAMALANE PROJECT MANAGER
Damon Crume
Program Manager, Landscape and Grounds
Willamalane Park and Recreation District
682 36th Street
Springfield, OR 97478
Email: damonc@willamalane.org
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PROJECT LOCATION
Dorris Ranch

ATTACHMENTS TO RFP
Exhibit A1 – Map of Dorris Ranch
Exhibit A2 – Dorris Ranch Nut Harvest Records, 2011-2018
Exhibit B – Conceptual Filbert Orchard Replacement Schedule and Map
Exhibit C -- 2018 Integrated Pest Management Strategic Plan for Hazelnuts, Oregon State University Extension Service
Exhibit D – State Historic Preservation Office Memorandum of Agreement
Exhibit E – Proposers Certifications
Exhibit F – Standard Proposal Form
Exhibit G – Sample Contract

ONLINE INFORMATION
RFP Documents:  http://willamalane.org/planning/bids-rfps/
REQUEST FOR PROPOSALS (RFP)
Filbert Orchard Management Services at Dorris Ranch

Instructions to Proposers

SECTION 1. GENERAL INFORMATION

A. About the Requesting Agency

Willamalane Park and Recreation District (District) maintains and operates five recreation facilities and 46 parks and natural areas totaling nearly 1,500 acres. Highlights include 13 waterfront areas, 29 miles of hiking and biking trails, 17 sports fields, and 27 playgrounds. Willamalane offers recreation programs to people of all ages and abilities. Created by voters in 1944, Willamalane is a special tax district, separate from the City of Springfield, with its own boundaries. It is governed by a five-member, elected board of directors and managed by a district superintendent.

Dorris Ranch is the District’s second largest park at 258 acres (See Exhibit A1). Of the 258 acres at Dorris Ranch, 75 acres are managed as filbert orchards. Established in 1892, Dorris Ranch is recognized as the first commercial filbert orchard in the United States and is listed on the National Register of Historic Places (Exhibit D). The orchards have been in continuous, successful operation since 1905. 90% of the filbert trees at Dorris Ranch are of the ‘Barcelona’ variety, and the remaining 10% are ‘Daviana’ variety, but a phased effort to replace the orchard with varieties resistant to eastern filbert blight was initiated in 2016.

Dorris Ranch is a highlight of the District’s portfolio of parks and open spaces, and is an invaluable natural and cultural resource for the region. Increasing numbers of people visit Dorris Ranch to hike the trails, access the Middle Fork Willamette River Path, and to rent the facilities for special events (e.g., weddings, parties, family reunions, etc.). In addition, the District hosts summer camps and educational programs at Dorris Ranch.

Dorris Ranch is located at the corner of South Second Street and Dorris Street. It is bordered on the west by a well-established mobile home park and to the east and north by single family residences. The south border of the ranch is the Middle Fork Willamette River (see Exhibit A1).

B. Purpose of Solicitation

In this Request for Proposals (RFP), the District is seeking a qualified contractor (Contractor) to provide filbert orchard management services at Dorris Ranch. Orchard management services shall include the harvesting of filberts, orchard maintenance activities such as pruning, pest control, and fertilizing, as well as tree removal, tree planting, and tree watering as part of a comprehensive, multi-year orchard replacement plan.

The goal of this RFP is to enter into a three-year contract, which can be renewed up to two additional one-year periods, with a contractor for the purposes of filbert orchard management at Dorris Ranch.
SECTION 2. GENERAL REQUIREMENTS

2.01 SCOPE OF THE RFP

A. Description of Work

1. Annual orchard cultivation
   a. Pruning, and removal and burning of pruned material, including provision of a fire watch if deemed necessary by District.
   b. Fertilization of orchards.
   c. Mechanical management of orchard floor vegetation.
   d. Integrated Pest Management Program to manage pests.
   e. Weed and invasive vegetation abatement along orchard boundaries.

2. Annual orchard harvest
   a. Collect and box nuts with methods to maximize harvest yield.
   b. Transport nuts to processor.

3. General services and reports
   a. Submit an Annual Orchard Management Plan that details orchard management practices by month for a calendar year. For years that Orchard Replacement Plan work is scheduled, the work shall be incorporated into the Annual Orchard Management Plan.
   b. Contractor shall submit an Environmental Protection and Safety Plan prior to commencing work during the first year of the contract. Contractor should articulate what measures will be taken to minimize adverse impacts to native vegetation, wildlife, and water quality. The plan should also outline how the applicant will ensure their own safety and that of the public, as required by state and federal law, using methods that are consistent with recognized industry best practices; specifically practices recommended in the 2018 Integrated Pest Management Strategic Plan for Hazelnuts published by Oregon State University Extension Service (Exhibit C).
   c. Provide an annual report of production yields, harvest revenues, and orchard management costs that satisfies the compensation and invoicing requirements.

4. Orchard replacement – Phase 2 (see conceptual schedule shown in Exhibit B)
   a. Tree removal
   b. Tree planting
   c. Watering

B. Necessary Equipment, Materials, Supplies, and Labor

Contractor shall provide all equipment, materials, supplies, and labor necessary for orchard management. Orchard management shall at all times be consistent with the best management practices in the filbert industry in the Willamette Valley; specifically practices recommended in the 2018 Integrated Pest Management Strategic Plan for Hazelnuts published by Oregon State University Extension Service (Exhibit C).
C. Annual Orchard Management Plan

By February 15th of each calendar year, the District and Contractor shall agree to a written Annual Orchard Management Plan. The plan will provide estimated dates for all proposed management actions, including pruning, pesticide (e.g., herbicide, insecticide, and fungicide) applications, fertilizer applications, harvesting, and any other proposed maintenance work. The goals of this plan are to: (1) provide clarity and transparency about what actions will be occurring throughout the year, (2) improve the timing and effectiveness of maintenance actions at the orchard and other maintenance activities that occur at Dorris Ranch outside of this contract, and (3) reduce scheduling conflicts among the many activities that occur at Dorris Ranch.

1. **Orchard Replacement Plan.** Most of the filbert trees at Dorris Ranch are of the ‘Barcelona’ variety, a variety that is highly susceptible to a fungal infection called eastern filbert blight. The blight infects and kills trees over a period of years. Due to the presence of eastern filbert blight, the District began implementing a multi-year Orchard Replacement Plan in April 2016 (see Exhibit B). In spring 2016, approximately 1,200 trees in 14 acres of orchard were cut down and ground-up, and the ground-up biomass was burned in a biofuel energy facility to prevent the spread of the blight. In fall 2016, these 14 acres were replanted with approximately 1,400 – 1,600 trees of the blight resistant ‘Jefferson’ variety and the pollinating ‘Yamhill’ and ‘Eta’ varieties.

The next phase (Phase 2) of tree removal and tree replanting is currently proposed for 2020. The conceptual Orchard Replacement Schedule is presented in Exhibit B. As part of preparing an Annual Orchard Management Plan, the District and Contractor shall coordinate to determine the sections of the orchard and the actual acreage to be replaced through Phase 2. Contractor shall advise the District on which varieties of filbert to replant based on commercial production and consumption trends in the domestic and international markets, projected cultivation and management costs beginning with pre-plant to and through maturity, and compatibility with industry-recommended Integrated Pest Management practices. The Contractor shall be responsible for implementing future phases of the Orchard Replacement Plan that fall within the contract term, including any extensions of the original three-year term. The overall boundaries of the orchard must be maintained through the replanting project, as stipulated by the State Historic Preservation Office (Exhibit D).

D. Notification and Posting Prior to Work

1. **Notification.** Contractor shall notify District Project Manager, via email, no less than 48 hours prior to accessing Dorris Ranch to implement management actions. District shall confirm by telephone or email that access is granted.

2. **Posting.** After access to the site has been granted by District to Contractor, District shall post the filbert orchard appropriately to limit or prohibit public access to the area where Contractor is working. Posting will occur at the front gate, bicycle/pedestrian access gates, and other areas where public and District employees normally enter Dorris Ranch. The District will make reasonable effort to discourage public access to portions of Dorris Ranch in which Contractor is working; however, prevention of public access is not guaranteed.
E. Compensation

Compensation will occur for two categories of work: (1) regular orchard management, and (2) orchard replacement plan work. Regular orchard management refers to all activities (and all materials and supplies used in such activities) associated with maintaining and harvesting existing orchards, including management of invasive weeds and vegetation along the orchard boundaries. Orchard replacement work refers to tree removal and tree replanting activities associated with replacing orchards with trees resistant to eastern filbert blight (see Exhibit B).

1. Regular orchard management. District shall reimburse contractor per the agreed upon methodology for regular orchard management work. The methodologies used for the past five years, and the associated filbert harvest rates are shown in Exhibit A2.

2. Orchard replacement plan work. District shall reimburse Contractor for expenses associated with removing existing filbert trees, replanting and cultivating new filbert trees associated with the District’s Orchard Replacement Plan (see Exhibit B).

F. Access

Contractor shall have access to Dorris Ranch via the gravel road at the intersection of South Second Street and Dorris Street. In addition, Contractor shall have access to any other road within Dorris Ranch when performing services pursuant with an Annual Orchard Management Plan.

G. Safety

1. Application of pesticides and fertilizers. All pesticide applications shall be conducted under the appropriate provisions of the Oregon Department of Agriculture’s (ODA) pesticide applicators license requirements and in accordance with product labeling. Contractor shall follow ODA pesticide applicator regulations and ensure that all crew members are properly licensed per the ODA Pesticide Applicator or Trainee/Apprentice license requirements. At the time of submitting its Proposal, Proposer shall provide documentation that the Contractor, and/or their designated field supervisor, is licensed in the State of Oregon, under the appropriate categories, to handle and apply pesticide and fertilizers at the work site and/or to supervise a trainee.

2. Storage of pesticides and fertilizers. Except for pesticides and fertilizers authorized in writing by District for use in orchard management, Contractor shall not bring any regulated or hazardous chemicals to Dorris Ranch.

3. Use of vehicles and equipment. The Contractor is responsible for providing all vehicles and equipment in good working order, personal protective equipment consistent with product labeling, and other materials and supplies required to complete the work.

4. Environmental Protection and Safety Plan. Contractor shall submit an Environmental Protection and Safety Plan prior to commencing work. Contractor should articulate what measures will be taken to minimize adverse impacts to native vegetation, wildlife, and
water quality. The plan should also outline how the applicant will ensure their own safety and that of the public, as required by state and federal law. The plan shall incorporate methods that are consistent with recognized industry best practices; specifically practices recommended in the 2018 Integrated Pest Management Strategic Plan for Hazelnuts published by Oregon State University Extension Service (Exhibit C).

Elements of the Environmental Protection and Safety Plan shall address:

a. How the Contractor intends to efficiently and effectively apply pesticides to control target species while preventing the misapplication of pesticides to desirable (non-target) vegetation in frequently variable field conditions (i.e., wind, moisture, precipitation, temperature, etc.).

b. How the Contractor will minimize potential for over-spraying or spraying non-target species while work is underway.

c. Measures for rectifying instances when pesticides have been misapplied to a non-target species.

d. Where and how pesticide mixing and refilling will typically take place, and what equipment will be on hand to prevent and contain leaks and spills.

e. Emergency contact info including the name and phone number for an offsite contact.

H. Storage

Contractor may store equipment and supplies at Dorris Ranch in predetermined District designated areas. Unless changed by District, the parties agree that the designated areas are normally near the Dorris House, and during the harvest season, in the vicinity of the Pump House. District reserves right to give Contractor notice to move any equipment or supplies, and Contractor shall comply within 24 hours. Except for loss or damage cause by negligence of the District, Contractor will be liable for any loss or damage of equipment and supplies while in storage.

2.02 MINIMUM QUALIFICATIONS

The applicant must demonstrate substantial training, experience, knowledge, and expertise in filbert orchard management. Qualifications must include at least five years of managing a filbert orchard of 50 or more acres and appropriate certification as a pesticide applicator from the Oregon Department of Agriculture.

2.03 TERMS OF THE RFP

The District reserves the right to:

- Change the schedule of the Proposal and the selection process;
- Delay, suspend, or cancel the procurement or reject any or all Proposals in accordance with ORS 279B.100; and
- Seek clarification of each Proposer’s Proposal if necessary during the evaluation process.
2.04 DISTRIBUTION OF REQUESTS FOR PROPOSALS

The full RFP, including all documents, supporting materials, and any Addenda, will be available for viewing online and/or in-print beginning on October 30, 2019 as noted in the Schedule in Section, 3.01, below. Proposers shall pay the cost of reproduction of RFP documents.

To View Online:  
https://www.willamalane.org/bids___rfps.php

To View in Print:  
Bob Keefer Center  
Willamalane Center  
250 S. 32nd St.  
Springfield, OR 97478

Each Proposer shall submit their name, postal address, and email address to the Project Manager for the purposes of developing a Plan Holder’s List and sending out addenda issued. Please email damonc@willamalane.org.

2.05 NOTICE AND AMENDMENT OF RFP

Any changes or additions to the RFP content developed after the release of the RFP will be described in addenda. Such changes and/or additions include any change of dates in the RFP Schedule. In the event that it is necessary to amend, revise, or supplement any part of the RFP, a written addendum will be issued and posted online via the District’s website. It is the proposer’s responsibility to check Willamalane’s website: https://www.willamalane.org/bids___rfps.php for posted addenda. Any addenda so issued shall be considered part of the specifications of the RFP. The District is not responsible for any explanation, clarification, interpretation, or approval made or given in any manner except by written addenda issued by the District. In the case of any doubt or differences of opinion as to the services to be furnished hereunder, or the interpretation of the provisions of the RFP, the decision of the District shall be final and binding upon all parties.

The District will not issue addenda less than 72 hours (3 calendar days) prior to 8:00 AM on the proposal closing date. Should the proposal closing date be extended by addendum, the extended proposal closing date will supersede the prior closing date in determining the 72-hour addendum window. Proposers should check the District website frequently until Closing, i.e., at least once weekly until the week of Closing, and at least once daily the week of Closing.

2.06 INQUIRIES

All questions and contacts with the District regarding the RFP must be addressed in writing, via email, to the Project Manager:

Damon Crume  
Program Manager, Landscape and Grounds  
Willamalane Park and Recreation District  
682 36th Street  
Springfield, OR 97478  
Email: damonc@willamalane.org  
Phone: 541-736-4111
Statements made by the District’s Project Manager are not binding on the District unless confirmed in writing via an addendum. Addenda will be issued for significant clarifications that arise during the response period up to the final date of addenda issuance.

Contact with other District staff without prior clearance from the Project Manager may result in Proposer disqualification.

2.07 TRADE SECRETS AND PUBLIC RECORDS LAW

All submittals become the property of the District and will not be returned to the Proposer. The District shall retain the RFP and one copy of each original Proposal received, together with copies of all District documents pertaining to the award of a contract. These documents will be made a part of a file or record, which shall be open to public inspection after Proposer selection and award is announced. If a Proposal contains any information that is considered a trade secret under ORS 192.345(2), Proposers must mark each sheet of such information with the following legend: "This data constitutes a trade secret under ORS 192.345(2), and shall not be disclosed except in accordance with the Oregon Public Records Law, ORS Chapter 192."

Oregon Public Records Law exempts from disclosure only bona fide trade secrets, and the exemption from disclosure applies only "unless the public interest requires disclosure in the particular instance." Therefore, non-disclosure of District documents or any portion of a District document submitted as part of a Proposal may depend upon official or judicial determination made pursuant to the Public Records Law.

In order to facilitate public inspection of the non-confidential portion of the Proposal, material designated as confidential shall accompany the Proposal, but shall be readily separable from it. Prices, makes, model or catalog numbers of items offered, scheduled delivery dates, and terms of payment shall be publicly available regardless of any designation to the contrary. Any Proposal marked as a trade secret in its entirety will be considered non-responsive.

2.08 NO OBLIGATION

All Proposers who submit a Proposal in response to this RFP are deemed to understand, acknowledge and agree that the District is not obligated as a result of the submittal of a Proposal to enter into a contract with any Proposer and, further, that the District has absolutely no financial obligation to any Proposer arising from responding to this RFP. All Proposers who respond to this solicitation do so solely at their own expense.

2.09 NON-RESPONSIVE PROPOSALS

Proposers are responsible for carefully reading all the terms and conditions contained in the RFP (including the terms and conditions contained in any attachments, exhibits or schedules to the RFP), and for following the instructions given. Proposals that do not contain all the information requested may be rejected as non-responsive.

The District may reject any Proposal not in compliance with all prescribed public procurement procedures and requirements, and may cancel this solicitation or reject for good cause any or all Proposals upon a finding by the District that it is in the public interest to do so.
2.10 INSURANCE

Throughout the Project, the Proposer must have and maintain in force, at its own expense, all insurance, required by the District, noted below:

(1) Workers Compensation insurance in compliance with ORS 656.017. All employers, including Contractor, that employ subject workers who work under this Contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.127. Contractor shall ensure that each of its subcontractors complies with these requirements. Contact Willamalane Risk Management at 541-736-4033 if exempt. The Contractor shall provide, at its expense, until one (1) year after the Date of Acceptance of all the Work, statutory workers’ compensation insurance and employer’s liability insurance with limits of not less than $100,000 each accident for bodily injury by accident, $100,000 each employee for bodily injury by disease, $100,000 policy limit for bodily injury by disease.

(2) The Contractor shall provide, at its expense, until two (2) years after the date of Acceptance of all of the Work, commercial general liability insurance sufficient to protect the Contractor in performing the Work covered by the Contract from claims for bodily injury and personal injury and property damage that may arise because of the nature of the Work or from operations under these Contract documents. Contractor and all of its subcontractors shall at all times carry a General Liability type insurance policy with limits of not less than $2,000,000 each occurrence (or each claim if coverage is afforded on a claims made basis) and $4,000,000 in the annual aggregate. If this policy is a "claims made" type policy, the policy type and company shall be approved by the District prior to commencement of the Work.

(3) Commercial Automobile Liability insurance, including owned, non-owned and hired automobiles, in an amount not less than a combined single limit of $2,000,000 for each occurrence, or the equivalent of not less than $2,000,000 for each accident for Bodily Injury and Property Damage, including coverage for owned, hired and non-owned vehicles. “Symbol One” coverage shall be designated.

(4) Notice of cancellation or change. There shall be no cancellation, material change, reduction of limits or intent not to renew the insurance coverage(s) without 30 days written notice from the Contractor or its insurer(s) to the District. This notice provision shall be by endorsement physically attached to the certificate of insurance.

(5) Additional Insured. For general liability insurance and the Contractor’s automobile policy, the District, the Project Manager, and the District’s directors, officers, agents, and employees will be Additional Insureds, but only with respect to the Contractor’s services provided under this contract. This coverage shall be by endorsement physically attached to the certificate of insurance.

(6) Extended Reporting Coverage (“Tail Coverage”). If any of the aforementioned liability insurance is arranged on a “claims made” basis, “tail” coverage is required at the completion of the Contract for a duration of 24 months, or the maximum time period the Contractor’s insurer will provide such if less than 24 months. Contractor shall furnish certification of “tail” coverage, or continuous “claims made” liability coverage, for 24 months following Contract completion. Continuous “claims made” coverage will be acceptable in lieu of “tail” coverage provided its retroactive date is on or before the effective date of the Contract.
(7) Maximum Deductible/Self-Retention. Any deductible or self-retention must be disclosed on the certificate of insurance and no deductible or retention may exceed $25,000 without the prior written consent of the District.

(8) Certificates of Insurance. Contractor and all subcontractors shall deliver to the District, prior to the commencement of the Work, a certificate of insurance or the actual insurance policy/policies evidencing all policies required by this Contract. Either the certificates of insurance or the policies shall contain the promise of the insurer to give the district written notice at least thirty (30) calendar days prior to the effective date of any lapse, cancellation, non-renewal or material reduction in any of the required coverages. In the event the insurer cannot or will not provide such written notice to the District, Contractor has an affirmative duty to provide the notice of lapse, cancellation, and non-renewal or material reduction to the District within 24 hours of the Contractor receiving such notice itself. The District has the right to reject any certificate and/or policy if the District in its sole discretion determines that either the coverage or the insurance company is unacceptable. Evidence of continuous coverage is required, including renewal certificates for any policies that renew during the project.

(9) Subcontractor Insurance. The Contractor shall require that all of its subcontractors of any tier provide insurance coverage and limits identical to the insurance required of the Contractor under the Contract, unless this requirement is expressly waived in writing by the District. The sufficiency of subcontractor insurance and coverage limits is subject to the District’s approval and must be shown by appropriate insurance certificates in a form acceptable to the District.

(10) Primary Coverage. All insurance carried by the Contractor or a subcontractor required by this Contract must be primary to and non-contributory with any insurance carried by the District or self-insurance of the District. Any insurance held by the District is excess and solely for damages or losses for which District is responsible.

2.11 COMPLIANCE WITH TOBACCO POLICY

The Contractor shall comply with the District’s Tobacco Policy, which states, that smoking any substance is not allowed in any District park, trail or facility, including parking lots. The policy includes tobacco, electronic cigarettes and marijuana. Violators may be subject to exclusion from District property. The District may, at its sole discretion, exercise full authority relating to this policy during provision of contracted services, up to and including contract termination.

2.12 INVOICING

Invoices shall specifically identify compensation due in the two categories of work described in section 2.01(E): (1) regular orchard management, and (2) orchard replacement plan work. Specifically, costs incurred for implementation of the Orchard Replacement Plan shall be documented and invoiced as follows:

1. Orchard Management
   a. Labor hours for each discrete task and corresponding rates
   b. Materials costs per acre
   c. Total cost per acre

2. Orchard Replacement Plan
a. Number of trees removed and disposed  
b. Number of trees planted  
c. Labor hours for each discrete task and corresponding rates  
d. Materials cost per acre  
e. Total cost per acre

SECTION 3. PROPOSAL PROCESS AND REQUIREMENTS

3.01 SCHEDULE

This RFP initiates a competitive sealed proposal solicitation open for submittal and subsequent evaluation and award of contract in accordance with the schedule below.

<table>
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<tr>
<th>Event</th>
<th>Date/Time</th>
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<tbody>
<tr>
<td>RFP Issue Date</td>
<td>October 30, 2019</td>
</tr>
<tr>
<td>Solicitation Protest Deadline</td>
<td>November 22, 2019 by 5 p.m.</td>
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<td>Proposal Due Date</td>
<td>December 5, 2019 by 2 p.m.</td>
</tr>
<tr>
<td>Proposal Opening and Evaluation</td>
<td>December 5, 2019 at 2:15 p.m.</td>
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<td>Notice of Intent to Award Contract</td>
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</tr>
<tr>
<td>Selection Protest Deadline</td>
<td>December 26, 2019 by 5 p.m.</td>
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3.02 SUBMITTING PROPOSALS

All Proposals, including attachments, shall be delivered or mailed and received by the Project Manager no later than 2 p.m. on December 5, 2019. No other materials shall be submitted with the Proposal, except those specifically identified in Section 3.03, below. Proposals received after the specified time and date will not be given further consideration.

Submit three copies, including one original Proposal, in a sealed, opaque envelope(s) with the following information clearly identified on the outside of the envelope:

SEALProposed Proposal ENCLOSED
Filbert Orchard Management Services at Dorris Ranch
Willamalane Park and Recreation District
[Proposer’s Name]

3.03 PROPOSAL SUBMITTAL REQUIREMENTS

Proposals shall conform to the following formatting requirements:

1. Proposals shall be typed and prepared in a simple, economical manner.

2. Proposals shall not exceed 10 single-sided, 8-1/2 x 11-inch, white paper pages (regardless of the text equivalency in page length), including pictures, charts, graphs, tables and text. The following are excluded from the 10-page limit: transmittal letter, resumes of the proposed key individuals, updated Proposer Profile, and Proposer Certifications. These items are to be appended at the end of the Proposal.
3. Proposers shall make every effort to use no less than a 12-point font and no less than 1-inch margins for the text portion of their Proposals. The District reserves the right to reject Proposals that are deemed illegible or too difficult to read.

Proposals shall contain the following information:

1. **Standard Proposal Form (Exhibit E).** Form must be signed by a person authorized to represent the firm.

2. **Contact Information** - Provide the address, telephone, email and fax number of the nearest office to Springfield, Oregon, and the specific name and title of firm’s designated contact.

3. **Work Program** - The applicant shall submit a Work Program detailing how the requested scope of services will be carried out in accordance with Section 2.01 of this RFP. The Work Program shall include the following sections:

   a. **Annual Orchard Management Plan** - Describe the annual sequence of management activities that will be used to manage and harvest the orchard. Include a description of pruning methods, what pesticides and fertilizers will be used, and what equipment will be used.

      The Work Program shall incorporate methods that are consistent with recognized industry best practices; specifically practices recommended in the 2018 Integrated Pest Management Strategic Plan for Hazelnuts published by Oregon State University Extension Service (Exhibit C). Pesticides classified and listed as “highly hazardous” in Appendices C and E of Exhibit C shall not be utilized. Additionally, only those pesticides rated as either “Excellent” or “Good” in Appendices D-1, D-2, and D-3 shall be utilized, unless otherwise approved by District in advance.

      The Work Program should account for all orchard harvest and management tasks, including annual clearing of non-native and invasive vegetation (e.g. blackberry, etc.) along the boundaries of the orchard where it interfaces with remainder woodlands.

   b. **Orchard Replacement Plan** – Describe the methods that will be used throughout the duration of the Contract, including any authorized extension to the Contract, to replace the existing orchards with blight resistant varieties for the next scheduled phase of orchard replacement in 2020 (see Exhibit B).

      The Work Program shall include a preliminary proposal for selection of filbert varieties to be replanted that is based on the factors described in Section 2.01.C.1, and include the percent composition of each variety if more than one is proposed. A budget of $80,000 should be assumed for the purpose of preparing the proposal and determining the possible acreage of orchard to be replanted, inclusive of associated costs incurred during Year One through Year Five of the replacement/replanting phase.
4. **Experience and References** - Provide a summary of your firm’s experience, knowledge, and expertise in the management of filbert orchards. Summary shall include contact names, phone numbers and addresses of references that can speak knowledgeably about the Contractor’s abilities, experience, and skills in the area of filbert orchard management. The District reserves the right to contact references to verify information provided.

5. **Project Team Members** - List all key personnel assigned to the project by name and title. List the years of experience that each team member has in filbert orchard management. Include the name and contact information of at least two references that can speak knowledgeably about each team member’s experience. The District reserves the right to contact references to verify information provided.

6. **Conflict of Interest** - Proposer shall address any potential conflicts of interest with any person or organization affected by actions performed by the firm on behalf of the District. Although such involvement will not be an automatic disqualification, the District reserves the right to consider the nature and extent of such work in evaluating the proposal.

7. **Cost Proposal** – The cost proposal should be divided into two sections:
   a. **Regular (annual) orchard management**: The cost (compensation) proposal must specify the disbursement of annual harvest revenues, or alternate method for the Proposer’s compensation, by defining a percentage of revenue shares to establish District and Contractor financial obligations and entitlements. See Exhibit A2 for the revenue sharing agreements and harvest rates for the past five years.
   b. **Orchard replacement**: The cost proposal should specify a compensation method associated with implementing the next phase(s) of orchard replacement that is based on the factors described in Section 3.03.3, above (see Exhibit B).

8. **Proposer Certifications (Exhibit E)**. Form must be completed and signed by a person authorized to represent the firm.

9. If Proposer is a partnership or joint venture, information must be provided for each partner or joint venturer, and each partner or joint venturer must sign the Proposal and any contracts on behalf of both itself and the Proposer, and each will be jointly and severally liable.

10. The Proposer shall state whether it is a resident Proposer as set forth in ORS 279A.120. See Section 4.02, below, for Evaluation Scoring Matrix.

### 3.04 SOLICITATION PROTESTS

Protests of the requirements, evaluation criteria, or contractual provisions in the RFP, or requests for changes or clarifications of the RFP shall be made in writing, via email to the Project Manager by the deadline stated in Section 3.01 of this RFP. Protests of, and requests for changes to, technical or contractual requirements, specifications, or provisions shall include the reason for the
protest and any proposed changes to the requirements. No such protests or request will be considered if received after the deadline.

3.05 SITE VISIT

If Contractor would like to visit Dorris Ranch prior to submitting a proposal, Contractor may contact the District’s Project Manager. Visits by Contractors are permitted only during park hours.

3.06 OFFERS VALID AND BINDING

Pursuant to OAR 137-047-0480, each Proposal constitutes a Firm Offer, irrevocable and binding on the Offeror for a period of ninety (90) calendar days following Closing of the RFP.

SECTION 4. PROPOSAL EVALUATION PROCESS

4.01 GENERAL INFORMATION

This section describes the criteria by which Proposals will be evaluated and the selection process of the highest ranked Proposer. A selection committee chaired by the District Project Manager and comprised of District staff will evaluate Proposals for conformity with stated submittal requirements, and content and quality of the responses, as called for in Sections 4.02 and 4.03 herein, in accordance with the evaluation procedures set forth in ORS 279B.060 and OAR 137-047-0600.

The District will provide written determination of the Proposal that is the most “advantageous” to District, as defined in OAR 137-047-0100, based on the evaluation process, any factors described in this RFP, and any applicable preferences described in ORS 279A.120 and ORS 279A.125. District intends to award the contract to the Proposer that presents the best capabilities, approach and value to provide the required product and services as outlined in this RFP.

Additional information required for proper assessment of proposals may be requested from the Proposer at the discretion of the District. All costs associated with submittal preparation will be borne by the Proposer.
4.02 EVALUATION SCORING MATRIX

Cost will be a consideration, but not the only factor, in the Proposal evaluation and selection process. It is in the interest of the Proposer to provide a clear and complete Proposal which presents thorough responses and demonstrates both technical and economic advantages. As part of their proposal, the proposer must demonstrate training, experience, knowledge, and expertise in filbert orchard management.

All Proposals will be evaluated by the District selection committee based on the following criteria:

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Work Program (including Annual Orchard Management Plan and Orchard Replacement Plan)</td>
<td>25</td>
</tr>
<tr>
<td>Assessment Questions:</td>
<td></td>
</tr>
<tr>
<td>• Does the proposed work program completely respond to the elements described in Section 3.03?</td>
<td></td>
</tr>
<tr>
<td>• How closely does the work program align with Exhibit C?</td>
<td></td>
</tr>
<tr>
<td>• Is the proposed replanting strategy responsive to the elements described in Section 2.01.C.1, and how well does the strategy utilize the assumed budget of $80,000?</td>
<td></td>
</tr>
<tr>
<td>2. Qualifications</td>
<td>25</td>
</tr>
<tr>
<td>Assessment Questions:</td>
<td></td>
</tr>
<tr>
<td>• Is documentation of the requisite experience, licensing and references provided?</td>
<td></td>
</tr>
<tr>
<td>• How many years of additional experience – beyond the minimum requirement of five – with managing an orchard of 50 acres or more does the Proposer have?</td>
<td></td>
</tr>
<tr>
<td>3. Cost for Regular (Annual) Orchard Management</td>
<td>25</td>
</tr>
<tr>
<td>4. Cost for next phase(s) of Orchard Replacement</td>
<td>20</td>
</tr>
<tr>
<td>5. Resident Bidder</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

4.03 OUTCOME OF EVALUATION PROCESS

The outcome of the written proposal Evaluation process may, at the District’s sole discretion, result in:

1. Further steps to gather additional information for evaluation, (e.g. checking references, requesting clarification, and a responsibility inquiry);

2. Notice to Proposer of rejection; or

3. Cancellation of the RFP and either re-issuance of the RFP in the same or revised form or no further action by the District with respect to the RFP.

4.04 RIGHT TO AWARD OR REJECT PROPOSALS

All Proposals will become part of the public record. In evaluating the Proposals, the District may
seek information from a Proposer to clarify the Proposer’s Proposal. In that event, Proposer must submit written and signed clarifications and such clarifications shall become part of the Proposal.

The District reserves the right to reject any and all Proposals received as a result of RFP and, if doing so would be in the public interest, cancel the solicitation. The District is not liable for any costs a Proposer incurs while preparing or presenting the Proposal or during further evaluation stages.

The District reserves the right to consider a Proposal or Proposals in whole or in part and to determine the responsiveness of a Proposal by reference to the Proposal taken as a whole. Proposers will be held to the terms submitted in their Proposals. Failure to meet these obligations will result in cancellation of acceptance of any apparent successful Proposal.
SECTION 5. AWARD NOTICE, SELECTION PROTESTS

5.01 TENTATIVE AWARD NOTICE

Based on the results of the submitted Proposals, a notice of selection will be sent to all Proposers. Following selection, the District intends to negotiate with the top-ranked Proposer to enter into a contract.

The District reserves the right to negotiate a final contract which is in the best interest of the District and the public. Once a tentative selection has been made by the selection committee, and approved by the District’s Board, District staff will attempt to negotiate a contract with the highest-ranked Proposer. If the negotiations are not successful, the staff will negotiate with other qualified Proposers in the order of their respective qualifications until an agreement is reached or the staff decides to terminate the selection process.

5.02 SELECTION PROTESTS

Any Proposer who claims to have been adversely affected or aggrieved by the selection of a competing Proposer shall have seven (7) calendar days after notification of the selected Proposer to submit a written selection protest to the Project Manager. This written notification is to be received by 5:00 p.m. of the last day of the seven (7) calendar-day period. No protest against selection of a contract or award of a contract will be considered if received after the deadline established for submitting such protest.
Exhibit A1
Map of Dorris Ranch

LEGEND
- TRAIL
- PAVED MULTI-USE PATH *
- ROAD
- PRIVATE ROAD - CLOSED
- FUTURE TRAIL
- DISTANCE MARKER
- PARKING
- INFORMATION KIOSK
- RESTROOMS
- VIEWPOINT

1. 0.60 miles
2. 0.53 miles
3. 0.38 miles
4. 0.43 miles
5. 0.12 miles
6. 0.08 miles
7. 0.09 miles
8. 0.30 miles
9. 0.41 miles
10. 0.29 miles

* MIDDLE FORK PATH:
The 4-mile-long, 10-foot-wide pathway runs from Clearwater Park to Dorris Ranch.
EXHIBIT A2

Past compensation schedule for regular orchard management.

Over the past five years, Willamalane had an agreement with the following compensation methodology for regular (annual) orchard management. This information may be helpful to Proposers as they develop their compensation proposals for the contract.

Compensation for regular orchard management will be based on harvested filberts as described below. Contractor shall inform District where the harvested filberts will be sold and the price/pound received. After drying changes, sorting changes (if any), and any other normal buyer's charges/assessments, the net proceeds shall be divided as follows:

### 2011-2018

<table>
<thead>
<tr>
<th>Price per Pound</th>
<th>Proceeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $0.60 per pound</td>
<td>75% to Contractor, 25% to District</td>
</tr>
<tr>
<td>$0.60 to $0.85 per pound</td>
<td>70% to Contractor, 30% to District</td>
</tr>
<tr>
<td>$0.86 to $1.10 per pound</td>
<td>65% to Contractor, 35% to District</td>
</tr>
<tr>
<td>Over $1.11 per pound</td>
<td>60% to Contractor, 40% to District</td>
</tr>
</tbody>
</table>

If the field price is between $1.25 and $1.40 per pound and the net graded payable weight is over 250,000 pounds, there will be an additional 5% bonus to District (i.e., 55% to Contractor, 45% to District).

If the field price is over $1.38 per pound and the net graded payable weight is over 300,000 pounds, then there will be an additional bonus of 5% to District (i.e., 50% to Contractor, 45% to District).

### 2019

<table>
<thead>
<tr>
<th>Field Price per Pound</th>
<th>Proceeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $0.75 per pound</td>
<td>75% to Operator, 25% to WPRD</td>
</tr>
<tr>
<td>$0.75 to $0.90 per pound</td>
<td>70% to Operator, 30% to WPRD</td>
</tr>
<tr>
<td>Over $0.90 per pound</td>
<td>65% to Operator, 35% to WPRD</td>
</tr>
</tbody>
</table>

**NOTE:** The percentage distributions established in the above table shall be adjusted based on the following net dry merchantable weights.

i. Over 100,000 pounds, WPRD shall receive 100% of its share.
ii. 75,000 to 100,000 pounds, WPRD shall receive 85% of its share.
iii. Under 75,000 pounds, WPRD shall receive 75% of its share.

**Materials and supplies.** At no time will the District pay additional compensation to the Contractor for the purchase and application of materials and supplies, including but not limited to, herbicides, pesticides, fungicides, and fertilizer.
**EXHIBIT A2**

**Dorris Ranch Nut Harvest, 2013-2018**

<table>
<thead>
<tr>
<th>Harvest Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds (Dry Wt.)</td>
<td>237,146</td>
<td>172,917</td>
<td>126,801</td>
<td>114,145</td>
<td>99,616</td>
<td>118,235</td>
</tr>
<tr>
<td>Harvest Dollars</td>
<td>$266,380</td>
<td>$282,551</td>
<td>$148,384</td>
<td>$159,700.44</td>
<td>$89,235.73</td>
<td>$67,655.40</td>
</tr>
<tr>
<td>District Share</td>
<td>$112,193</td>
<td>$129,930</td>
<td>$58,913</td>
<td>$71,995.44</td>
<td>$39,081.77</td>
<td>$24,874.78</td>
</tr>
<tr>
<td>Price/lb.</td>
<td>$1.12</td>
<td>$1.63</td>
<td>$1.17</td>
<td>$1.18</td>
<td>$0.965</td>
<td>$0.62</td>
</tr>
</tbody>
</table>
## EXHIBIT B-1

Conceptual Filbert Orchard Replacement Schedule and Map

<table>
<thead>
<tr>
<th>Orchard Name</th>
<th>Acres</th>
<th>Phase</th>
<th>Year</th>
<th>Trees to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walnut - north</td>
<td>7</td>
<td>1*</td>
<td>2016</td>
<td>700</td>
</tr>
<tr>
<td>Cannery</td>
<td>7</td>
<td>1*</td>
<td>2016</td>
<td>537</td>
</tr>
<tr>
<td>Walnut - south</td>
<td>15</td>
<td>2</td>
<td>2019</td>
<td>2000</td>
</tr>
<tr>
<td>Mann - south</td>
<td>4</td>
<td>2</td>
<td>2019</td>
<td>266</td>
</tr>
<tr>
<td>Front Orchard</td>
<td>4</td>
<td>3</td>
<td>2022</td>
<td>404</td>
</tr>
<tr>
<td>Snell</td>
<td>3</td>
<td>3</td>
<td>2022</td>
<td>260</td>
</tr>
<tr>
<td>Mann - north</td>
<td>3</td>
<td>3</td>
<td>2022</td>
<td>266</td>
</tr>
<tr>
<td>Goat</td>
<td>6</td>
<td>4</td>
<td>2025</td>
<td>348</td>
</tr>
<tr>
<td>7-acre Cherry</td>
<td>7</td>
<td>5</td>
<td>2028</td>
<td>456</td>
</tr>
<tr>
<td>Clump</td>
<td>5</td>
<td>5</td>
<td>2028</td>
<td>304</td>
</tr>
<tr>
<td>Nursery</td>
<td>4</td>
<td>6</td>
<td>2031</td>
<td>404</td>
</tr>
<tr>
<td>Black Walnut</td>
<td>10</td>
<td>7</td>
<td>2034</td>
<td>1340</td>
</tr>
</tbody>
</table>

### NOTES:

Replacement schedule is subject to revision or adjustment at the District's discretion.

* Replanting completed in 2016 – currently in “Year 3.”
EXHIBIT B-2
Conceptual Filbert Orchard Replacement Schedule and Map

ORCHARD REPLACEMENT
Wilamette plans to remove diseased trees from Dorris Ranch orchards in staggered, three-year phases:

- 2016
- 2019
- 2022
- 2025
- 2028
- 2031
- 2034

Orchard to be preserved
An Integrated Pest Management Strategic Plan for

HAZELNUTS in Oregon and Washington

Katie Murray and Paul Jepson
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Katie Murray, statewide IPM coordinator, Integrated Plant Protection Center, and assistant professor of practice, Department of Environmental and Molecular Toxicology; and Paul Jepson, professor, Integrated Plant Protection Center, Department of Environmental and Molecular Toxicology, Oregon State University.

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Published December 2018
Process for this Integrated Pest Management Strategic Plan (“IPMSP”)

In a proactive effort to identify pest management priorities and lay a foundation for future strategies and increased use of integrated pest management in hazelnut production, growers, commodity-group representatives, pest control advisors, processors, university specialists, and other technical experts from the hazelnut industry in Oregon and Washington formed a work group and assembled this plan. Members of the group met for a day in February 2018, in Salem, Oregon, where they discussed and reached consensus about this plan. It outlines major pests, current management practices, critical needs, activity timetables, and efficacy ratings of various management tools for specific pests in hazelnut production. The result is a strategic plan that addresses many IPM and pest-specific critical needs for the Oregon and Washington hazelnut industry.

A list of top-priority critical needs was created based on a group voting process at the work group meeting. This was drawn from an assessment of all the needs that appear throughout the document, which were compiled from work group members. A list of broader IPM needs was also compiled, based on work group-cited needs related to specific topics. Crop-stage-specific critical needs are also included, listed, and discussed throughout this publication.

This strategic plan begins with an overview of hazelnut production. The overview is followed by discussion of critical production aspects of this crop, including the basics of IPM in hazelnut production in this region. Each pest is described briefly, with links provided for more information about the biology and life cycle of each pest. Within each major pest grouping (insects, diseases, and weeds), individual pests are presented in alphabetical order, not in order of importance. The remainder of the document is an analysis of management practices and challenges organized by crop life stage in an effort to assist the reader in understanding whole-season management practices and constraints. Current management practices are presented using a “Prevention, Avoidance, Monitoring, and Suppression” (PAMS) framework to place practices within a simple IPM classification and to demonstrate areas where additional tools or practices may be needed. For more information, see Appendix F, “Using PAMS Terminology” (page 56).

Trade names for certain pesticides are used throughout this document as an aid for the reader. The use of trade names in this document does not imply endorsement by the work group or any of the organizations represented.
Work Group Members

Workgroup members in attendance
Michelle Armstrong, Wilbur-Ellis
Wayne Chambers, grower
Jeff Choate, Oregon State University Extension Service, Lane County
Brian Holmquist, Holmquist Hazelnuts
LeRoy Kropf, grower
Peter Kuenzi, Pratum Coop
Betsey Miller, Entomology, Oregon State University
Matt Miller, grower
Marcelo Moretti, Weed Science, Oregon State University
Meredith Nagely, Oregon Hazelnut Commission
Jeff Newton, Christensen Farm
Polly Owen, Oregon Hazelnut Commission
Andrew Pokorny, Crop Production Services
Jay W. Pscheidt, Botany and Plant Pathology, Oregon State University
Vaughn Walton, Entomology, Oregon State University
Nik Wiman, Horticulture, Oregon State University

Others in attendance
Amanda Crump, Western Integrated Pest Management Center
Dan Edge, Associate Dean, Oregon State University
Paul Jepson, co-facilitator, Integrated Plant Protection Center, Oregon State University
Tunyalee Martin, University of California IPM Program
Katie Murray, facilitator, Integrated Plant Protection Center, Oregon State University

Contributing members not present at meeting
Joe DeFrancesco, Integrated Plant Protection Center, Oregon State University
2018 Updates to 2006 Summary of Critical Needs

Research

- Cultivar development, with emphasis on resistance to eastern filbert blight disease.
  Continuation of a robust breeding program is critical for eastern filbert blight disease management and management of other pests that can severely affect the viability of the hazelnut industry in Oregon and Washington.
  **2018 update:** New, resistant cultivars have been developed, but potential new eastern filbert blight isolates continue to pose challenges to resistant cultivar development. Because many of these cultivars are only single-gene resistant, stacked gene resistance (horizontal as well as vertical) is needed.

- Development and refinement of management techniques for control of eastern filbert blight disease in existing orchards.
  This disease is widespread and devastating, reducing yields and eventually causing death in both young and old trees. Management of eastern filbert blight in established orchards with susceptible cultivars is critical.
  **2018 update:** This remains a top priority of the Oregon Hazelnut Commission, and is a continuing need.
  New chemistries and combinations for control are needed, as well as monitoring performance of the new eastern filbert blight resistant varieties. Although pruning management has improved, unmanaged orchards remain a major source of inoculum.

- Continued investigation of the biology, ecology, and management of filbertworm.
  Filbertworm is the most serious insect pest in hazelnuts. Feeding reduces nut quality and yield. Filbertworm is a perennial problem and occurs in virtually all hazelnut orchards.
  **2018 update:** While this remains the most serious insect pest in hazelnut, there has been progress. Research on pest biology and ecology are under way, and a commercially available mating disruption product is now available with increasing utilization, especially with organic producers. Before mating disruption was available, organic growers had no viable options.

- Development of an integrated pest management program that emphasizes the protection of beneficial arthropods that occur naturally in hazelnut orchards.
  Beneficial arthropods play an important role in the management of insect pests in hazelnut orchards. Learning more about beneficials and how to protect them will help reduce pesticide use and other pest management inputs.
  **2018 update:** The mating disruption program began based on this need. Softer insecticides were more expensive, and mating disruption was more economical. A program for protection of beneficials remains a need, including protection of predators for pests such as brown marmorated stink bug, Pacific flatheaded borer, and aphid, as well as the impacts of orchard floor leaf management on beneficial insects.

- Investigation of the biology, ecology, and management of the filbert weevil.
  The filbert weevil is a new pest in hazelnut orchards, and much needs to be learned about its behavior and management. Some of the damage attributed to the filbertworm may be caused by the filbert weevil.
  **2018 update:** The filbert weevil is not a major pest issue in hazelnut orchards.
Regulatory

- Ensure that regulators and pesticide registrants include hazelnuts in nut group registrations and labels.

  Tolerances established for almonds and pecans, the representative commodities in EPA Crop Group 14 (Tree Nuts), enables hazelnuts to be included in registrations, but hazelnuts are often overlooked when labels are written.

  **2018 update:** Hazelnuts are now part of Crop Group 14, and the industry has gained several new fungicide registrations under this designation, but this remains an issue.

- Retain the registration for chlorpyrifos (Lorsban), which plays a unique and important role in insect pest management in hazelnut orchards.

  The fuming action of chlorpyrifos enhances control of insects that are difficult to control due to their habit of protecting themselves in rolled leaves (such as leafroller larvae).

  **2018 update:** Chlorpyrifos is no longer a go-to chemistry for leafroller, but remains an important product for the industry in controlling other insect pests, such as omnivorous leaffitter and Pacific flatheaded borer.

- Simplify and streamline the Section 18 process to ensure emergency use of pesticides in a timely manner.

  Section 18 registrations have in the past been very useful in helping to avert crop and economic losses, but the process is slow and cumbersome.

  **2018 update:** Some section 18 registrations have been developed and submitted, but the process remains slow and cumbersome, which poses a barrier to growers.

- Add filbert bud mite as a pest on the Envidor (spirodiclofen) label.

  Spirodiclofen is registered for use in hazelnuts, but the filbert bud mite is not listed on the label.

  **2018 update:** This was achieved, but the product is now used sporadically on bud mite, as efficacy is only fair and timing is complex.

- Continue legislative support for current right-to-farm laws.

  Growers rely on right-to-farm laws to help them remain productive as challenges from the rural-urban interface continue to grow.

  **2018 update:** Production practices such as airblast spraying, dust management, and aerial application continue to pose a challenge with production near urban areas.

Education

- Communicate to regulators and legislators the importance and necessity of maintaining the registration of chlorpyrifos, which plays a unique role in a hazelnut IPM program.

  **2018 update:** This product remains in use, as of the publication of this plan.

- Continue to communicate to growers the latest research findings and continue to educate them about pest management strategies that can be used in hazelnut orchards.

  **2018 update:** This is an ongoing need for the industry.

- Educate growers about best management practices that can be used in
their orchards and about how to communicate those practices to neighbors, legislators, and the general public.

**2018 update:** This is an ongoing need for the industry.

- The urban-rural interface is a major issue where hazelnuts are grown. Maintain good communication with neighbors and the community about the best management practices that are used in hazelnut production.

**2018 update:** This is an ongoing need for the industry.
Top-Priority Critical Needs, 2018

The following critical needs were voted top-priority by the work group members present at the meeting. Crop-stage-specific aspects of these needs, as well as additional needs, are listed and discussed throughout the body of the document.

Research topics

- Research best practices for irrigation amount and timing (including when to stop) with respect to impacts in intercropping, nut fill, bacterial blight, and root-rot management.
- Meet the high demand for the samurai wasp \textit{(Trissolcus japonicus)} that controls brown marmorated stink bug through parasitism, and research the risks versus benefits of this biocontrol method.
- Evaluate ideal levels of foliar nutrition and soil fertility, and the contribution from plant stimulants.
- Research best practices for orchard-floor management to maximize pest management efficacy and minimize pesticide run-off.
- Research application technology best practices that maximize efficacy and minimize pesticide losses.

Regulatory actions

- Address pest management limitations on farms in urban-rural interface areas.
- Develop a cultivar certification program to ensure that new cultivars are true to type.
- Expand registrations from other FRAC classes (class 4 or others) to continue to manage disease resistance, especially for controlling phytophthora root rot, which is controlled with a narrow range of products.
- Register horticultural oils for use in conventional hazelnut production.
- Seek clarification on how to calculate the total number of applications per season when spot-spraying herbicides.
- Offer incentives for using lower-risk management options that are often more costly to growers.

Education

- Educate pest managers on softer management options for leafrollers and other insect pests to reduce reliance on chlorpyrifos.
- Educate pest managers on best practices for soil conservation.
- Educate pest managers on the use of flailing for pest management and weed control.
- Educate pest managers on best practices in application technology.
- Revive and increase engagement with the hazelnut sustainability program.
Hazelnut Production Overview

Although there is a species of hazelnut that is native to the Pacific Northwest, it is the European hazelnut, *Corylus avellana* L., which is grown for commercial nut production in Oregon and Washington. This cultivar was introduced to the region in the mid-1800s. While most people nationally and internationally use the term “hazelnut,” some growers and local residents in the Pacific Northwest use the term “filbert.” Thus, several of the pests associated with hazelnuts, such as “filbertworm” and “eastern filbert blight,” carry this moniker.

While the hazelnut tree itself is quite hardy, satisfactory crops are produced only under moderate climatic conditions. Hazelnuts grow best on deep, river-bottom soils but also grow well on a wide variety of other soil types. Both the soils and climate in the western regions of Oregon and Washington are well suited to hazelnut production.

The Willamette Valley region of western Oregon produces over 99 percent of U.S. hazelnuts, with hazelnuts ranking as Oregon's 11th most valuable agricultural commodity. In 2016, Oregon produced approximately 44,000 tons of hazelnuts from 37,000 producing acres, with a value of $118.8 million. Washington produces a small amount of hazelnuts. This combined Oregon-Washington production represents about 5 percent of the world's hazelnut production, with Turkey and Italy being the top global producers.

In Oregon, the majority of the production takes place in the Willamette Valley in western Oregon, located between the Cascade Mountains and the Coast Range. As of November 2017, Marion County has the most acreage, at 16,914 acres, followed by other Willamette Valley counties: Yamhill, Linn, Polk, Clackamas, Washington, Lane, Benton, Douglas, and Multnomah.

Commercial hazelnut production in Washington occurs in the western part of the state. The two main production areas are in Clark County in the southern part of the state near the Oregon border, and in Whatcom County in the northern part of the state near the Canadian border. Higher land costs and cooler winter temperatures limit Washington's hazelnut production.

There is a growing national and international demand for organic hazelnuts. Although there is a small amount of organic acreage in Oregon and Washington, the expansion of organic acreage has been limited primarily by the challenge of controlling filbertworm organically while maintaining a profit. The Pacific Northwest hazelnut industry is interested in developing a cost-effective organic hazelnut production system, but this remains a challenge.

Although hazelnuts are produced in orchards as a single-stem tree, the plant grows naturally as a bush or multi-stemmed shrubby tree. In hazelnut production, suckers growing at the base of the tree that would normally fill in to create a shrubby tree are removed throughout the year to maintain a single-stemmed tree. Hazelnut trees can attain a height of over 40 feet when planted in good soil and managed with proper pruning, fertilization, and pest control practices.

Female hazelnut flower clusters begin to form on the current season's growth, usually in midsummer. They are first noticeable in November or December, and reach maturity (open blooms) during the winter. Male flowers (catkins) also form early in the growing season and can be first seen in midsummer, but they don't reach maturity until winter. Pollination can occur anytime between late November and early March, but peak pollination occurs during the winter, usually in January and February. Extreme cold temperatures (less than 10 to 15 degrees Fahrenheit) can damage male and female flowers and reduce crop yield, but the mild winter weather common in western Oregon and Washington is generally conducive to a successful and profitable hazelnut crop.

Hazelnuts are not self-fertile but are cross-pollinated. Their pollen is dispersed by wind. Pollinizer cultivars are planted within the hazelnut orchard so that the cultivar of
the main crop is no more than 50 feet from a pollinizer tree. Pollinizer cultivars must be compatible with the recipient cultivar, should yield well, must produce nuts that have similar characteristics to the main cultivar, and most importantly, must be resistant to eastern filbert blight disease. Often two or three different pollinizer cultivars are dispersed within the orchard to ensure a ready supply of pollen during the long period of female flower receptivity. The cultivar Daviana is a common pollinizer in older orchards that are planted with the cultivar Barcelona. However because of Daviana’s extreme susceptibility to eastern filbert blight, growers have aggressively replaced it with other compatible pollinizers over the years.

Historically, 60 to 70 percent of Pacific Northwest hazelnut orchards were planted with the cultivar Barcelona, an older cultivar with many good attributes, including good yields, a vigorous and upright growth habit, and round-shaped nuts that are medium to large in size, have excellent flavor, and are suitable for both the kernel and the in-shell market. Barcelona does, however, have some undesirable characteristics, the most important of which is that it is only moderately resistant to eastern filbert blight disease.

Since 2007, the Oregon State University hazelnut breeding program has been developing cultivars to improve on Barcelona. These have many desirable characteristics, such as heavy annual production, fewer blanks and kernel defects, and resistance to eastern filbert blight.

Early cultivar releases from the breeding program, such as Santiam, Lewis, Clark, and Sacajawea, and their pollinizers including Delta, Epsilon, Gamma, and Zeta show quantitative resistance to eastern filbert blight. More recently, newer releases expressing greater resistance to eastern filbert blight and exceptional qualities include Dorris, Felix, York, Jefferson, Wepster, McDonald, Yamhill, and PollyO. Some of these commercial varieties pollinate each other, thus eliminating the need for a pollinizer that generally produces a lesser quality nut. With a total of 67,000 acres planted as of November 2017, the percent of Barcelona has dropped by half, to around 30 percent.

Hazelnut trees do not produce a commercially harvestable crop until the third to fifth year in the ground, and it can take trees 10 to 12 years to reach full production. If they are well-managed, hazelnut trees can remain productive for 40 to 60 years or even longer. Since nuts are produced mostly on new wood, adequate fertilization and pruning are necessary to increase and maintain tree vigor. In addition to annual applications of nitrogen and potassium, trees respond to foliar- or soil-applied boron, which increases nut set.

Hazelnuts begin to drop to the ground during the month of September. Prior to nut drop, the orchard floor is made level and smooth, and weeds are flail-mowed to facilitate harvest. Harvest generally occurs during October and is usually a two-step operation. Once most of the nuts have fallen, nuts on the orchard floor are mechanically swept into a windrow between the tree rows. Then a harvesting machine picks up the nuts from the windrow and drops them into a tote box or trailer. New harvesters are slowly being adopted that do not require windrows.

The nut harvester also separates out twigs, leaves, and other debris as the nuts are being harvested. The nuts are then transported out of the orchard to a cleaning and drying facility. Once dried, the nuts are sold in the shell, or shelled and sold as kernels or further-processed products. The 10-year average (ending in 2017) indicated 6 percent sold on the domestic inshell market, 60 percent sold in the export inshell market, and 34 percent sold on the kernel market. Most kernels are sold domestically.

As of 2017, the 10-year average of nuts produced per acre was 2,480 pounds. Production from mature orchards ranges from less than 1,000 pounds to more than 4,000 pounds of dry nuts per acre depending on soil type and management practices. The value of the nut crop varies from year to year, and the price per pound that Pacific Northwest growers receive is strongly influenced by worldwide hazelnut prices. In the past 5 years, the price per pound received by Oregon and Washington growers has ranged from $1.02 to $1.80, with an average of $1.38.
The hazelnut industry relies heavily on integrated pest management to control insects, diseases, vertebrates, and weeds that are found in hazelnut orchards while reducing the amount of pesticides that are used for pest management. IPM techniques used in hazelnut orchards are based on both scientific research and grower experience. The hazelnut industry has strongly supported IPM research for more than five decades.

Advances in insect management practices have included the development of monitoring techniques and treatment thresholds for filbert aphid and filbert leafroller, which have reduced prophylactic insecticide applications. Advances have also included the use of pheromone traps and a degree-day model for filbertworm, which permit precise, targeted treatments for this pest. The most valuable result of this IPM approach has been the successful identification and introduction of a filbert aphid parasitoid, *Trioxys pallidus*. This parasitoid, a small Braconid wasp, has provided nearly complete biological control of the filbert aphid and has almost eliminated insecticide use for this pest. Natural biological control of other hazelnut pests may also be enhanced by the aphid biocontrol program, because the elimination of aphicides improves survival of predators and parasitoids that attack leafrollers and filbertworm.

A potential biocontrol has also been identified for a newer hazelnut pest, the brown marmorated stink bug. A parasitic samurai wasp (*Trissolcus japonicus*) has shown success in parasitizing eggs. Continued research on this potential will be critical, because research has shown that pesticides are only a short-term solution for brown marmorated stink bug and will kill beneficial insects, including the samurai wasp.

It is especially important to preserve and enhance biological control of the filbert aphid. Resurgence of filbert aphid populations in recent years indicates a need for further research on cultural techniques to improve survival of *Trioxys pallidus*. Research is also needed to test new pesticides for adverse effects on this filbert aphid parasitoid and to determine the impact on hazelnut production of the recently introduced large hazel aphid (also known as the hazelnut aphid), which is not controlled by *Trioxys pallidus*. Research on the natural biological control and improved chemical control of pests such as filbert leafroller and filbertworm would have direct benefits (reducing insecticide use for these pests) and indirect benefits (enhancing survival and biocontrol success of *Trioxys pallidus*). Research has shown that mating disruption can reduce the amount of insecticide applied for filbertworm by up to 75 percent. This reduction in pesticides has the indirect benefit of preserving natural enemies of aphids (including *T. pallidus*). In a 5-year study, orchards managed with a combination of mating disruption and border sprays and/or target sprays saw a significant reduction in aphid populations, and a significant increase in parasitism by *T. pallidus*.

Eastern filbert blight disease (EFB) is the most serious, widespread, and limiting pest found in hazelnut orchards. It reduces nut yield and tree vigor and kills all but the roots of the tree. Left uncontrolled, it spreads rapidly from tree to tree and orchard to orchard. EFB, caused by the fungus *Anisogramma anomala*, was not confirmed in Pacific Northwest hazelnut orchards until the early 1970s. It is suspected that the disease was introduced on infected nursery stock.

Much time and money has been spent on research to understand the biology, ecology, and management of EFB. An integrated approach has been found to be the most successful method of managing and mitigating the effects of this disease. Growers are constantly scouting for disease symptoms. When they are discovered, infected twigs and branches are pruned out and burned. New growth is protected with carefully timed fungicide sprays. Most importantly, the Oregon State University breeding program, with
support from the hazelnut industry, has been developing cultivars that are resistant to EFB while maintaining desirable horticultural characteristics such as yield; nut shape, size, and flavor; tree vigor; and easy removal of husks. New orchards are being planted with EFB-resistant cultivars, and old orchards are seeing the replacement of EFB-susceptible pollinizer trees with resistant ones. Even fewer fungicide sprays may be required in hazelnut production once the industry is comprised of mostly EFB-resistant cultivars.

Other important diseases include bacterial blight (*Xanthomonas arboricola* pv. *corylina*) and root rot. Stressed hazelnuts are more susceptible to bacterial blight, such as when trees are planted on marginal sites or are water stressed in midsummer. There has been an increased incidence of bacterial blight in young hazelnut plantings, which leads some growers to overirrigate, resulting in root rot. However, the causes of root rot are not well known or researched.

Kernel molds are another problem, although less critical than other diseases. Moldy kernel incidence averages 0.5 to 1 percent annually, but mold incidence in individual orchards can often be much higher (from 3 to 10 percent). Various fungi reduce kernel quality, but the degree varies with the causal agent and environmental conditions during symptom development. Mold is often highest if rains are significant in spring or during harvest. Mold can also be a problem when bins filled with nuts are grouped together and left out in the rain before drying. Susceptibility to kernel mold is highly heritable, and can be minimized when selecting new cultivars. The cultivars Lewis and Santiam generally have higher levels of mold than Barcelona in any particular year.

Mature orchards tend to have few weed problems, because shading inhibits most weed establishment. Younger orchards have more light penetration and thus more weeds. Herbicides are used in young orchards, but growers also rely on irrigation management, mulch, and flail mowing to manage weeds. However, controlling suckers, or growth that develops from the root stock, is important for tree growth and health and often requires herbicide applications. Maintaining a vegetation strip between the tree rows and carefully timing mowing events provides habitat for beneficial insects that aid in insect pest management. The IPM techniques hazelnut growers use for weed and sucker management not only provide weed control but also help maintain biological diversity in the orchard.

The IPM practices used in hazelnut production help protect and maintain tree health and improve nut quality and at the same time provide a substantial reduction in pesticide use. Maintaining and improving this successful IPM program for insects, diseases, and weeds is critical for the future of the hazelnut industry.
IPM Critical Needs

The following list of broad IPM needs was compiled based on input from workgroup members. Participants were asked to identify specific needs related to each of the headings in bold.

**Development of nonchemical pest management options**

- Facilitate cooperation with packers to support producers in allowing for greater risk-taking with nonchemical methods.
- Develop and evaluate effective options for nonchemical and mechanical weed and sucker control, and use of cover crops.
- Incorporate more nonchemical management information into pest management guides.
- Improve the economics of using mating disruption; consider a subsidy program to make this more accessible to more growers.
- Provide more accessible information and better sources for effective non-chemical management products and activities.
- Invest resources into exploring new concepts, such as use of natural predators, mechanical weed control, etc.

**Whole-farm and areawide management**

- Educate growers about the use of mating disruption for filbertworm control.
- Research filbertworm migration patterns.
- Seek support and collaboration from groups such as Eugene Water and Electric Board (EWEB) in watershed protection.
- Increase communication about pests and management between growers, researchers, and consultants.
- Encourage more collaboration between growers.
- Provide incentives that allow growers to use more costly products.
- Evaluate locations where areawide management could be effectively implemented, and for which pests this would be beneficial.

**Beneficial and natural-enemy protection**

- Require more products to be protective of beneficials and natural enemies.
- Evaluate the impacts of current management practices on beneficials and natural enemies, and identify specific chemical and timing threats to specific beneficials.
- Educate growers on the benefits of beneficials and pollinators.
- Develop and/or register cost-effective, softer pesticide alternatives for major hazelnut pests to protect beneficials and natural enemies.
- Improve application technology and education to growers.
- Develop easy-to-implement management programs that protect natural enemies and pollinators.
- Increase grower use of mating disruption and cultural controls (flailing, groundcover management, etc.).
Ensure that there are no hives placed adjacent to hazelnut orchards, or that there is communication and coordination between growers and beekeepers if this happens.

Educate the public on the lack of insect pollinators in hazelnut orchards.

**Certification needs: Hazelnut Sustainability Program**

- Demonstrate the potential for an increase in profit with the Hazelnut Sustainability Program.
- Engage processors in this program in an effort to increase margins.
- Increase availability of chemicals from a range of mode-of-action classes.
- Engage global market buyers in the Hazelnut Sustainability Program.
- Increase grower understanding of this program and promote more grower participation through targeted outreach efforts.
- Increase public awareness of industry challenges and concerns, and long-term farm sustainability.
- Make growers aware of the sustainability document and guide.
- Include integrated pest management concepts and practices in the program.

**Human health and worker protection**

- Determine whether Ziram causes dermal reaction to workers.
- Provide grower and employee training through the Extension Service to address human health and worker protection issues.
- Improve on-farm posting protocols for protecting human health.
- Develop cultivars that require less pesticide use.
- Simplify and then educate growers and farm managers on the new standards.
- Identify and then educate on applicator technologies that reduce drift.
- Provide greater support to farmers on this topic, including accessible classes and trainings.

**Water quality**

- Educate growers and pest managers on how to avoid possible overapplication of pesticides and the idea that you can often achieve the same control with less product applied.
- Update the nutrient management guide with cultivar-specific information.
- Demonstrate to growers the benefits of grass buffer strips between orchards and waterways, cover crops, and other buffer options that protect water quality and minimize erosion.
- Educate growers on ways to increase pesticide efficacy to protect water quality.
- Determine whether propiconazole is washing out of hazelnut orchards into streams, and pursue mitigations if this is the case.
- Encourage collaboration between various utilities and watersheds to subsidize management practices that protect water quality.
- Determine the impact of leaf cover on pesticide movement to soil and water.
- Research and educate on best practices for orchard floor management.
List of Major Hazelnut Pests
(listed alphabetically)

Insect and mite pests

- Aphids (filbert and hazelnut)
- Borers (Pacific flathead and shothole)
- Brown marmorated stink bug (BMSB)
- Big bud mite
- Filbertworm
- Lecanium scale
- Leafrollers
  (Obliquebanded [OBLR] and filbert leafroller)
- Omnivorous leaftier
- Spider mite

Vertebrate pests

- Beavers
- Birds
- Deer
- Elk
- Gophers
- Moles
- Squirrels
- Voles

Invasive and emerging pests

- Asian shothole borer
- Eastern filbert blight
  (isolates from other North American regions)
- Emerald ash borer
- Garden symphylan
- Japanese beetle
- Light brown apple moth
- Pseudomonas
- Snails and slugs

Diseases

- Bacterial blight
- Eastern filbert blight
- Kernel molds
- Lichen and moss
- Root rots: *Phytophthora* and *Armillaria*
- Trunk cankers and branch dieback
  (not eastern filbert blight)
- Wood decay

Weeds

- Annual bluegrass (*Poa annua*)
- Annual ryegrass (*Lolium multiflorum*)
- Barnyard grass (*Echinochloa crus-galli*)
- Canada thistle (*Cirsium arvense*)
- Clover (red, white) (red: *Trifolium pratense*; white: *Trifolium repens*)
- Common dandelion (*Taraxacum officinale*)
- Crabgrass (*Digitaria spp.*)
- Dock (*Rumex crispus, Rumex obtusifolius*)
- Field bindweed (*Convolvulus arvensis*)
- Groundsel (*Senecio vulgaris*)
- Horsetail (*Equisetum arvense*)
- Mallow (*Hibiscus trionum*)
- Mayweed (dog fennel) (*Anthemis cotula*)
- Pineappleweed (*Chamomilla suaveolens*)
- Prostrate knotweed (*Polygonum arenastrum*)
- Quackgrass (*Elytrigia repens*)
- Sharp-point fluvellin (*Kickxia elatine*)
- Wild carrot (*Daucus carota*)
- Wild garlic (*Allium vineale*)
- Wild onion (*Allium canadense*)
- Yellow foxtail (*Setaria pumila*)
- Yellow nutsedge (*Cyperus esculentus*)
Hazelnut Pest Management
Timing by Crop Stage

Preplant through planting (includes year prior to planting)

- Bud mite, trunk borers
- Root rots, wet feet, eastern filbert blight, bacterial blight
- Weeds
- Birds, beaver, nutria, deer

Dormancy and pollination (November–February)

- Filbert worm
- Root rots, wet feet, eastern filbert blight, bacterial blight, lichen and moss
- Weeds
- Squirrels, voles

Bud break to shoot elongation (March–May)

- Bud mite, aphids, leafroller, leaftier, scale, trunk borers
- eastern filbert blight
- Weeds

Nut maturation (May–September)

- Aphids, trunk borers, brown marmorated stink bug, filbert worm, spider mite, scale
- Bacterial blight
- Weeds
- Rodents

Harvest through postharvest (September–November)

- Brown marmorated stink bug, filbertworm moth
- Kernel mold, bacterial blight, lichen and moss
- Weeds
Major Hazelnut Pest Descriptions

Insects and mites

Filbert aphid (*Myzocallis coryli*)
Hazelnut aphid (*Corylobium avellanae*)

For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-aphid

These are medium to small greenish aphids that feed on leaves (primarily filbert aphid) and husks (primarily hazelnut aphid), causing honeydew. Infestations can reduce percent fill and size of nuts. Damage caused by aphids can be cumulative over seasons, and heavy infestations should be controlled.

Big bud mite (*Phytocoptella avellanae*; *Cecidophyopsis vermiformis*)

For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-big-bud-mite

These are microscopic eriophyid mites that feed on leaves, flower buds, and catkins. Buds swell to a large size before they die and fall off. Infested buds do not produce nuts and can cause vegetative growth abnormalities. The Oregon State University hazelnut breeding program selects against bud mites, so blasted buds are less common in recent cultivar releases than in some legacy hazelnut varieties.

Brown marmorated stink bug (*Halyomorpha halys*)

For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-brown-marmorated-stink-bug

Brown marmorated stink bug is an invasive pest that is becoming an increasing problem on hazelnuts in the Willamette Valley. These insects can feed on vegetative structures or on nuts (shell thickness or hardness does not protect kernels from feeding damage), which can cause blank nuts, shrivel, or corking damage to the kernels.

Filbertworm (*Cydia latiferreana*)

For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-filbertworm

This insect is a key pest of hazelnuts in the Pacific Northwest. It is a close relative of codling moth, one of the most economically significant insects worldwide.

The filbertworm overwinters as a larva in a silken cocoon. These are mainly found under leaves and debris on the ground. Some larvae also overwinter just beneath the soil surface. After mating, the female moths begin to lay single eggs near developing nuts. When the eggs hatch, tiny larvae search out nuts. They burrow into the nut to feed on the kernel for 2 to 4 weeks before they bore their way out. Larval feeding within the nut destroys the kernel. The entry hole into the shell is not often seen, but the much larger exit hole is apparent after the larva has finished devouring the kernel.

Scale insects

Cottony maple scale (*Pulvinaria innumerabilis*)
European fruit lecanium (*Parthenolecanium corni*)
Excrecent scale (*Eulecanium excrescens*)

For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-scale-insect

Scale insects are closely related to aphids, mealybugs, and whiteflies. Like these insects, they also have piercing-sucking mouthparts. Mature scale insects resemble small helmets or bumps on branches, stems, and the underside of leaves. Severe infestations can kill twigs.
Large quantities of honeydew are produced, which causes growth of sooty mold fungus. Sooty mold fungus can impede photosynthesis, severely devitalize plants, and retard growth.

**Filbert leafroller** (*Archips rosana*)
- For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-filbert-leafroller
Damage from these insects begins early in spring, and includes rolling of leaves (for pupation) as well as larval feeding on foliage and buds.

**Obliquebanded leafroller** (*Choristoneura rosaceana*)
- For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-obliquebanded-leafroller
Larvae roll leaves together using silk to create protected feeding sites. Larvae feed on leaves, but may occasionally damage nuts if their feeding site happens to be within a nut cluster or in direct contact with a nut cluster.

**Omnivorous leaftier** (*Cnephasia longana*)
- For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-omnivorous-leaftier
Larvae appear in early spring and roll and feed on leaves or inside buds. The larvae web both leaves and flowers together and feed on developing buds, often resulting in destruction of the terminal growth. This pest has not been a major problem in recent years.

**Pacific flatheaded borer** (*Chrysobothris mali*)
- For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-pacific-flatheaded-borer
In hazelnuts, flatheaded borer has been a problem in young orchards, where small trees are attacked and often killed. Larvae enter the wood, boring out the cambium as they feed. Larval feeding beneath the bark can result in partial or complete girdling and subsequent tree death, but it can take time for the tree to completely die. The feeding site obstructs the flow of water and nutrients from the roots to the leaves and branches. The larvae have done most of the damage by the end of the growing season and they may move to the middle of the trunk to overwinter. In the spring, the larvae pupate and the adult chews its way out of the host. Some larvae may remain in the wood and emerge the following season.

**Shothole borer**
- European shothole borer, pear-blight beetle (*Anisandrus dispar*)
- Lesser shothole borer, fruit-tree pinhole borer (*Xyleborinus saxesenii*)
- Shothole borer (*Scolytus rugulosus*)
- For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-shothole-borer
This complex of small beetle species share the common name alias “shothole borer” because of the characteristic damage caused by entrance or emergence of adult beetles from the woody host, leaving many small holes resembling a shotgun pattern. Borers are especially attracted to unhealthy trees, but healthy trees growing adjacent to blocks of neglected trees also may be attacked, and hazelnut orchards adjacent to woodlands are also at risk.

**Spider mite** (*Tetranychus spp.*)
- For pest description information, see: https://pnwhandbooks.org/insect/nut/hazelnut/hazelnut-spider-mite
Spider mites are tiny, eight-legged, noninsect pests that suck juices and devitalize trees. Spider mites tend to occur on the underside of leaves. Webbing accompanies heavy infestations. Leaves become yellow and silver and may more easily sunburn. Spider mites are an increasing problem in hazelnuts, and in some cases severe defoliation can occur.
Diseases, viruses, and pathogens

**Bacterial blight** (*Xanthomonas arboricola pv. corylina*)

For pest description information, see: https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-bacterial-blight

Bacterial blight is caused by a bacterium that attacks buds, leaves, branches, and trunks. Occasionally it attacks nuts, but seldom invades roots. Tree mortality due to this disease is commonly found in orchards the first few years after planting. Rain splash or the movement of infected nursery stock spreads the bacteria. Water-soaked spots develop on leaves, and buds may turn brown and fail to leaf out. Lesions may girdle stems and kill them, and may extend into the main scaffold or trunk.

**Eastern filbert blight** (*Anisogramma anomala*)

For pest description information, see: https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-eastern-filbert-blight

This disease is caused by a fungus that has infected hazelnut orchards throughout the Pacific Northwest. The fungus has a life cycle of 2 or more years, including a 12- to 15-month latent period when no symptoms are visible. Infection occurs in wet weather from budbreak through shoot elongation. Infected branches may die suddenly from July to September, when expanding cankers girdle branches and limbs. If diseased limbs are not removed, most of the canopy of susceptible trees is usually dead within 7 to 15 years after the first infection.

**Kernel molds**

For pest description information, see: https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-kernel-molds

Kernel mold is defined as any visible growth of mold, either on the outside or inside of the kernel. In practice, any white, fuzzy mycelial growth is classified as mold. Research on specific causes of “mold” is lacking, and many different fungi are easily isolated from the shell or kernel, with surface sterilization, with or without any specific symptoms, before or after harvest.

Most mold symptoms develop between nut maturation and when kernels are dried postharvest. Fungi reduce kernel quality, but the degree varies with the causal agent and environmental conditions during symptom development.

The most common symptom in Oregon is a necrosis of the kernel tip, which usually extends into the kernel a few millimeters. Kernel tips are blackened and shiveled, partly reducing kernel quality. Internal discoloration of the kernel is another common symptom. Affected kernels change from a normal, opaque white to a translucent, buttery yellow and have a bitter, rancid flavor. The buttery yellow symptom is not always apparent on the kernel surface. Kernel shriveling in combination with sporulation of fungi on the kernel surface is another defect.

**Lichen and moss**

For pest description information, see: https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-mosses-lichens

A number of mosses and lichens grow on hazelnut. None are parasitic. Control may be desirable because ice or snow may accumulate on mosses and lichens and break branches.

**Root rots**

*Phytophthora* (“wet feet”)

*Armillaria*

For pest description information, see: https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-wet-feet https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-armillaria-root-rot
The first indication of root rot is usually poor growth of the shoots, together with premature dropping of the leaves. Symptoms above ground are not specific, and include a general decline. One part, side, or section of the tree may be affected at first. This corresponds to the side that is supported by the roots first attacked by the fungus. Trees may live for a number of years before finally dying.

**Trunk cankers and branch dieback (not eastern filbert blight)**
The Oregon State University Plant Clinic has diagnosed hazelnut cankers of various causes in the last 50 years. Most of these are due to eastern filbert blight, but a few have been attributed to other fungi. These other fungal cankers have not been fully studied to determine specific causes, the extent to which they are a problem in the industry, or the importance they might represent to the industry as a whole.

**Wood decay**
For pest description information, see: [https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-wood-decay](https://pnwhandbooks.org/plantdisease/host-disease/hazelnut-corylus-avellana-wood-decay)

Most fungi that cause extensive wood decay of nut trees are classified in the phylum Basidiomycota. Decay in a single tree may be caused by more than one fungal species. Wood decay fungi enter trees primarily through injuries, from pruning, sunburn, lightning, or cultivating equipment. Two types of wood decay occur in living trees: white rots and brown rots. White rots cause moist, soft, or spongy wood that is a lighter color than sound wood. Brown rots of wood are brown, dry, and crumbly, with longitudinal and transverse cracks. Wood decay leads to limb breakage, uprooted trees, trees broken at the soil line during windstorms, or decreased tree vigor and dieback.

**Weeds**
- Annual bluegrass (*Poa annua*)
- Annual ryegrass (*Lolium multiflorum*)
- Barnyard grass (*Echinochloa crus-galli*)
- Canada thistle (*Cirsium arvense*)
- Clover (red: *Trifolium pratense*; white: *Trifolium repens*)
- Common dandelion (*Taraxacum officinale*)
- Crabgrasses (*Digitaria* spp.)
- Dock (*Rumex crispus*, *Rumex obtusifolius*)
- Field bindweed (*Convolvulus arvensis*)
-Groundsel (*Senecio vulgaris*)
- Horsetail (*Equisetum arvense*)
- Mallow (*Hibiscus trionum*)
- Mayweed (*Anthemis cotula*)
- Pineappleweed (*Chamomilla suaveolens*)
- Prostrate knotweed (*Polygonum arenastrum*)
- Quackgrass (*Elytrigia repens*)
- Sharp-point fluvellin (*Kickxia elatine*)
- Wild carrot (*Daucus carota*)
- Wild garlic (*Allium vineale*)
- Wild onion (*Allium canadense*)
- Yellow foxtail (*Setaria pumila*)
- Yellow nutsedge (*Cyperus esculentus*)

**Including also:**
- Hazelnut rootstock suckers
The spectrum of weed species that can be found growing in hazelnut orchards varies depending upon soil type and microclimate conditions. Nevertheless, weed management is necessary, both prior to establishing a new orchard and once established. Weed control is important because it helps reduce competition for water and nutrients in young trees. Controlling weeds also assists in managing rodent populations by eliminating or reducing rodent habitat. Mature orchards tend to have fewer weed problems, because shading inhibits weed establishment. However, some perennial weeds, such as wild garlic, thrive under shady conditions.

Vegetation on the orchard floor throughout the winter aids in erosion control and contributes to better surface-water quality. Thus, the area between the tree rows might have a strip of grass sod or other vegetation that facilitates the ingress and egress of farm equipment, and weeds are managed within this strip.

Sucker control is also necessary to help keep the tree as a single-stemmed plant, to remove possible sources of eastern filbert blight infection, and to reduce competition for nutrients. Suckers are controlled with an herbicide when they are 6 to 18 inches tall. Taller suckers must be removed by hand.

Certain herbicides are allowed prior to planting that are not allowed after planting or in a bearing orchard. At and after planting, growers must use herbicides that are specifically recommended on the label for newly planted trees, or are known to be gentle on newly planted trees.

When herbicides are applied after the trees are planted, care is taken to avoid herbicide contact with the tree itself to reduce the likelihood of phytotoxic effects. Cracks or crevices around the tree are filled, and sawdust is applied around the base of the tree to further minimize the risk of herbicide injury. Tree guards are also used to protect trees from herbicide drift.

Spot spraying with a nonselective systemic herbicide is used to manage difficult-to-control perennial weeds. Flail mowing is also used to keep weeds between the tree rows under control, causing carbohydrate starvation and preventing weeds from flowering and setting seed. A preemergence herbicide with long residual properties is desirable so weeds are controlled all season.

**Vertebrate pests**

- Beavers
- Birds
- Deer
- Elk
- Gophers
- Moles
- Nutria
- Squirrels
- Voles

Several different types of vertebrate pests have the potential to reduce hazelnut tree vigor and nut yields. Deer, elk, gophers, and voles may be problematic throughout most of the year, and their feeding on roots, bark, or terminal growth can reduce vigor or cause plant death in newly planted orchards. Beavers, muskrats, and nutria may be problematic in hazelnut orchards that are located near waterways. They cause damage by feeding on bark, and in the case of beavers, they can cut down the entire young tree. Birds and squirrels have the most impact on yield loss prior to and during harvest, as they can remove a large volume of nuts from the orchard.
Beavers and nutria
Beavers and nutria can chew and girdle trees, and can be a particular problem in orchards located adjacent to waterways.

Birds
Crows and jays (Steller's and scrub jays) congregate in hazelnut orchards and can consume large quantities of nuts. Birds are generally controlled using auditory frightening devices and shooting.

Deer and elk
Deer and elk feed on foliage, twigs, buds, and nuts. This feeding can delay maturity, reduce yield, negatively impact growth, and in severe cases cause the death of young hazelnut trees. Sharpening their antlers damages the bark of young trees. Deer and elk can be year-round pests, during all stages of tree growth.

Various brands of chemical repellants are available that interrupt deer feeding by providing an unpleasant taste or disagreeable odor, but their effectiveness is generally inconsistent. Physical barriers such as fences offer the best control. Though effective, fencing is expensive and usually cost-prohibitive for most growers. Growers who apply for a crop-damage permit are allowed to shoot animals that are causing damage. This method is most effective for solitary deer or low deer pressure within the orchard.

Gophers and moles
Gopher activity in the orchard is indicated not only by chewing marks on the roots and bark, but also by the characteristic crescent-shaped mounds of soil on the surface, created as they burrow under ground. Gophers are especially attracted to orchards that have a succulent cover crop or other vegetation between tree rows. Gophers feeding on roots and tree bark can kill young trees.

Moles do not feed on plant roots or bark, and don’t cause direct damage to hazelnut trees. However, the circular mounds they create as they burrow into the soil interfere with mechanical harvesting of the nut crop.

Gophers and moles are controlled using aluminum phosphide. Pellets are applied to holes, burrows, or underground tunnels, and phosphine gas is released. This is effective for gopher control but not very effective for moles. Some growers also burn sulfur in tunnels and holes, which works best when soil moisture is high (when tunnels are slick and sealed). Many growers also use owl boxes and perches for hawks, which helps reduce gopher populations. Trapping can be effective, but it is very time-consuming and impractical. Propane is also used with limited success.

Squirrels (ground squirrels and tree squirrels)
Squirrels like hazelnuts and the bark of young hazelnut trees, causing a reduction in tree vigor and substantial yield loss if populations are excessive. Squirrels remove and eat nuts from trees and from the ground prior to harvest. Squirrels are controlled mainly by trapping, but also with repellants and shooting. A permit is needed for certain squirrel species (such as western and eastern silver gray squirrels). Trapping is effective but time-consuming and impractical, and it cannot eliminate all the squirrels in an orchard.

Voles
Voles, also known as field mice or meadow mice, feed on roots and tree bark near the ground. Their gnawing and chewing can girdle the roots and trunk of the plant. Subterranean feeding activity also creates air pockets along the root zone. The presence of voles is indicated by chewing marks on the tree trunk near the soil line and on roots, by surface runways in row middle vegetation, and by tunnel entrance holes about 1 inch in diameter.

Because voles depend on cover for protection, damage to trees is most severe when there is heavy sod, a cover crop, litter, or snow near the base of the tree. Voles damage
hazelnut trees during the fall, winter, and early spring when other food sources are limited. Their population size is cyclic, with peaks occurring about every 2 to 5 years. Severe vole damage can reduce plant vigor, lower nut yields, and even cause plant mortality.

Adjacent-area management (mowing around orchard borders) can help control voles, as well as habitat reduction through mowing in and between tree rows. Plant guards that are placed around the tree trunks to prevent sun scald can also inhibit above-ground vole feeding, but feeding can occur despite the guards. Owl boxes and perches for hawks can reduce populations.

### Invasive and emerging pests

#### Insects, symphylans, and slugs

**Asian, or polyphagous shothole borer** (genus: *Euwallecea*):

For details on this potential pest, see: https://ucanr.edu/sites/pshb/overview/About_PSHB/

This polyphagous shothole borer, native to southeast Asia, has been found on the coast of California, from Los Angeles to San Diego. The invasive black beetle is smaller than a sesame seed (around one tenth of an inch long). As with other borer species, the female beetles form tunnels in trunks and branches of host trees and lay their eggs inside. The females vector a fungus (*Fusarium euwallaceae*) that grows in these tunnels and provides the food source for adults and larvae. Borers can cause branches to die, and can eventually kill the whole tree. Monitoring this pest and its spread will be important for the hazelnut industry.

**Emerald ash borer** (*Agrilis planipennis*)

For pest description of *Agrilis planipennis*, and details of the response to the potential for this species to enter Oregon, see: https://digital.osl.state.or.us/islandora/object/osl%3A1013/datastream/OBJ/view

This borer has been found in many states across the eastern and southeastern United States as well as in Boulder, Colorado in 2013. (http://www.emeraldashborer.info). Although only ash species have been attacked by this pest in North America, other host trees may be colonized. Monitoring for this pest and its potential for spread will be important for the hazelnut industry.

**Garden symphylans** (*Scutigerella immaculata Newport*)

For a description and other information about *Scutigerella immaculata*, see: https://pnwhandbooks.org/insect/ipm/garden-symphylan

Garden symphylans are not insects, but members of the class Symphyla. They are small, white, centipede-like soil arthropods that infest many home gardens and agricultural soils in western Oregon and Washington and throughout the United States. They feed on sprouting seeds, roots, and other subterranean plant parts. Economic damage occurs from direct feeding on roots, rhizomes, and tubers, from establishment through plant maturity. Damage can include seedling death, poor growth, stunted plants, and reduced vigor and yield.

Symphylans have been found in hazelnut orchards and have caused economic damage to trees. However, correct diagnosis of symphynl problem problems is sometimes challenging, since damage may be exhibited in a number of forms, and symphylans are not always easy to find when damage is observed.

Symphylans exhibit large vertical migrations in the soil profile, and they are very difficult to manage, other than by planting nonpreferred hosts in the period prior to orchard establishment.
**Japanese beetle** (*Popillia japonica*)
The Japanese beetle is highly destructive. It feeds on hundreds of host plants, including hazelnut trees in some regions. Adult beetles feed on foliage and can cause skeletonization and severe defoliation. Monitoring the spread of this pest will be important for the hazelnut industry.

**Light brown apple moth (LBAM)** (*Epiphyas postvittana*)
The Oregon Department of Agriculture (ODA) caught one light brown apple moth in 2010, two in 2015, and three in 2016. All moths were caught within a 1-square-mile area in Polk County, indicating the presence of a breeding population of LBAM. In 2017, ODA began a LBAM eradication project in this area, which included trapping, mating disruption, and biological pesticide applications. Trapping and monitoring continues for this pest.

**Snails and slugs**
For basic details of management in Oregon, see: [https://pnwhandbooks.org/insect/ipm/slug](https://pnwhandbooks.org/insect/ipm/slug)
Slugs are a key pest in many cropping systems in the agriculture-rich Willamette Valley in western Oregon. They can feed on both underground plant parts and foliage, especially on young plants.

**Diseases**

**Eastern filbert blight isolates from other North American regions**
Eastern filbert blight is endemic to eastern North America. It is strongly suspected that a single introduction occurred into Oregon, based on sampling throughout the production region in 2015. Other strains of *Anisogramma anomala* from eastern North America could overcome the single dominant-resistance gene bred into new cultivars and widely planted in the Pacific Northwest. There are restrictions in Oregon on commercial and ornamental hazelnut cultivars imported from out-of-state (OAR 603-052-0825), but other isolates are still feared.

**Pseudomonas**
Hazelnut bacterial canker, *Pseudomonas avellanae* (*P. syringae* pv. *coryi*), causes a hazelnut decline, and is present in about 1,000 out of the 20,000 hectares of hazelnut orchards in central Italy. It has also been found in northern Greece. The main symptoms include the rapid wilting of twigs, branches, and trees during spring or summer. Characteristically, the leaves remain attached to the twigs after they wither. The Oregon Invasive Species Council has this disease on a list of the 100 least-wanted species.

**Weeds**
None at this time.
Hazelnut Pest Management Activities by Crop Stage

Preplant through planting (includes the year prior to planting)

Preplant includes soil preparation and pest management activities prior to planting and at planting, as well as cultural or pest management operations that occur immediately after planting. Planting generally takes place between November and February in Oregon. It can be as late as May in some areas of Washington before the ground is warm enough for planting. The major management issue during this stage is managing weeds in preparation for planting.

The site for a hazelnut orchard is carefully considered prior to planting. The soil is amended and prepared to receive hazelnut trees that will remain in the ground for many years. Soil testing is performed for nutrients and for pH, and adjustments are made prior to disk the ground and planting. The soil is ripped or subsoiled if a hardpan exists. Tree and row spacing varies depending on the cultivar planted and the soil type.

Growers use intercropping to protect against soil loss, improve the soil metrics, and reduce weed competition. Intercropped plants are chosen carefully based on how production (fertility, pesticide needs, timing) coincides with hazelnut production practices. Grass seed, wheat, and clover seed are common intercropped plants in hazelnut orchards.

Since trees don’t yield a commercially harvestable crop of nuts until the third to fifth year, and full production is not reached until 10 to 12 years after planting, intercropping with a suitable crop or double planting of hazelnut trees (half of which are removed when the trees reach full production) are options to speed economic returns while the orchard is maturing.

Orchard sites are generally not fumigated prior to planting. Perennial weeds are treated weeks or months before the planting date, and growers monitor for insects. Trees are treated prior to or after planting for disease control, particularly for bacterial blight, which causes damage mostly to young trees.

Field activities and pest management decisions that occur during preplant through planting

- Site selection based on soil type
- Land preparation: removal of roots and rock
- Tiling for soil drainage
- Soil testing (for physical characteristics and pH)
- Applying lime to soil
- Herbicide application
- Cultivation
- Testing for symphylans
- Planting trees
- Planting intercrop (if used)
- Grid marking tree rows
- Establishing irrigation
- Fertilization (after planting)
<table>
<thead>
<tr>
<th>PAMS(^1) practice</th>
<th>Preplant through planting: pest management activities</th>
<th>Target pest(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevention</strong></td>
<td>Use of berms/tiling to improve drainage</td>
<td>Diseases: root rots and wet feet</td>
</tr>
<tr>
<td><strong>Avoidance</strong></td>
<td>Careful cultivar selection to ensure quality. Selecting based on: bare root stock versus micro propagated stock, intended use for kernel market or inshell, harvest date, disease resistance. Selecting out low-quality stock</td>
<td>Eastern filbert blight, bacterial blight, insects (bud mite), mold</td>
</tr>
<tr>
<td></td>
<td>Staking trees to ensure vigor and minimize wind/ice damage and bird breakage</td>
<td>Snow, ice, wind, and bird damage</td>
</tr>
<tr>
<td></td>
<td>Tree height topping/heading to control growth and height; develop scaffold limbs</td>
<td>Snow, ice, wind, and bird damage</td>
</tr>
<tr>
<td></td>
<td>Maintain shallow planting depth to encourage healthy roots</td>
<td>Disease control (root rots and wet feet)</td>
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<tr>
<td></td>
<td>Fertilization to maintain healthy, vigorous trees</td>
<td>Shothole borer, Pacific flatheaded borer, bacterial blight, general pest defense</td>
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<td></td>
<td>Fencing (low, hot wire)</td>
<td>Beaver, nutria</td>
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<tr>
<td></td>
<td>Fencing (not often economically viable)</td>
<td>Deer</td>
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<tr>
<td></td>
<td>Application of Surround WP (kaolin clay) as repellant</td>
<td>Deer</td>
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<tr>
<td></td>
<td>Foliar application of Thiram as repellant (on nonbearing only)</td>
<td>Deer</td>
</tr>
<tr>
<td></td>
<td>Application of blood products as repellant</td>
<td>Deer</td>
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<tr>
<td><strong>Monitoring</strong></td>
<td>Weed and disease monitoring</td>
<td>General weeds and diseases</td>
</tr>
<tr>
<td></td>
<td>Monitoring for anything feeding on emerging leaves</td>
<td>Insects</td>
</tr>
<tr>
<td><strong>Suppression</strong></td>
<td>Cultivation</td>
<td>Weeds, symphylans</td>
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<tr>
<td></td>
<td>Herbicide applications:</td>
<td>Weeds</td>
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<tr>
<td></td>
<td>- 2,4 D + triclopyr (Crossbow)</td>
<td>Disease and insect control (shothole borer, Pacific flatheaded borer); sunburn protection</td>
</tr>
<tr>
<td></td>
<td>- Glufosinate (Rely)</td>
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<tr>
<td></td>
<td>- Glyphosate (Roundup)</td>
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<tr>
<td></td>
<td>- Oxyfluorfen (Goal)</td>
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<tr>
<td></td>
<td>- Pendimethalin (Prowl)</td>
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<td></td>
<td>- Simazine (Princep)</td>
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<tr>
<td></td>
<td>- Triclopyr (Garlon)</td>
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</tr>
<tr>
<td></td>
<td>Painting trunks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applying tree guards</td>
<td>Chemical/sunburn protection</td>
</tr>
<tr>
<td></td>
<td>Mulching around base of trees, with sawdust or compost or both</td>
<td>Bacterial blight, weed control, herbicide damage prevention, retains moisture, prevents stress to trees</td>
</tr>
<tr>
<td></td>
<td>Preplant copper applications to stock</td>
<td>Bacterial blight</td>
</tr>
<tr>
<td></td>
<td>Preplant neonicotinoid treatment (usually imidacloprid)</td>
<td>Trunk borers (shothole borer, Pacific flatheaded borer)</td>
</tr>
</tbody>
</table>

\(^1\) See Appendix F, “Using PAMS Terminology,” page 56.
Critical needs for pest management during preplant through planting

Research topics

- Testing and research to determine which pests and diseases are coming from nurseries (possibly symphyllans, phytophthora root rot, bacterial blight, others).
- Research the biology of and best management for phytophthora root rot.
- Develop a method for portable, handheld cultivar testing of stock in field to ensure stock is true to intended cultivar.
- Develop a method for DNA testing of blight resistant cultivars to ensure resistant genes are present; lack of trust in the resistant cultivars can lead to unnecessary use of fungicides.
- Establish ideal nutrient needs for young plants to avoid overfertilization.
- Develop irrigation best practices for young plants.
- Breed new cultivars with insect, mite, and multigenetic disease resistance.
- Identify best practices for young orchard weed and sucker control to prevent phytotoxicity on young trees.
- Research the efficacy of neonicotinoid treatment of seedlings (as root drenches or dips) in limiting trunk borer damage.
- Investigate the role of plant vigor in young trees’ susceptibility to diseases and pests.
- Investigate best management practices for accelerating nut production.
- Determine best practices for orchard establishment for organic production.
- Research to determine the relative efficacy of various types of trunk guards versus trunk paints.
- Research to discover the unintended impacts of certain management practices (for example, spraying for sucker control can injure tree bark; use of trunk guards can lead to vole/borer damage underneath the guards; impacts of flailing on beneficials and insect pests).
- Research copper resistance in bacterial blight.
- Research the impact of adjuvants used for sucker control on crop safety.
- Develop best practices for insecticide, fungicide, and herbicide resistance management.
- Determine methods for nonchemical orchard floor management to effectively control weeds.
- Research safe and registered pesticides (insecticides, fungicides, and herbicides) to use for intercropping.
- Research on herbicide carryover from previous crops. (For example, are there potential carryover issues with terbacil?)

Regulatory actions

- Strengthen nursery testing standards to ensure clean plant material.
- Develop a cultivar certification program using genetic markers developed by the USDA germplasm lab.
- If found efficacious, use research data to justify labeling neonicotinoids for use preplant.
- Register alternative FRAC groups (such as group 4) for hazelnut for phytophthora root rot. Only products from FRAC group 33 are registered, and resistance could become an issue.
- Clarify and standardize herbicide label language regarding applications before planting, at planting, and at replanting.
- Clarify crop name on regulatory labels to use just one name (hazelnut) and not both filbert and hazelnut.
- Get clarity from Oregon Department of Agriculture regarding the use of pesticides on intercrops such as grass seed, wheat, and clover seed, and the instances where requiring a registration on both hazelnut and the intercrop presents challenges to growers. (Clopyralid [Stinger] and pyrasulfotole + bromoxynil [Huskie] are two examples of products labeled for grasses that might be used as intercrops, but not labeled in hazelnuts).
- Clarify label language to ensure advisory statements are clear regarding the impacts of factors that drive pesticide efficacy, such as weather and temperature.

**Education**

- To help improve pest management through better-targeted irrigation and nutrition, the industry needs a specialist in these two areas.
- Educate growers and pest managers on strategies to minimize stress in young orchards.
- Educate growers, pest managers, and industry organizations on their respective roles in disseminating and using important and current research and information.
- Educate growers and pest managers on the unintended impacts of management practices (for example, spraying for sucker control can injure tree bark; use of trunk guards can lead to vole and borer damage underneath the guards).
- Educate growers and pest managers regarding the impacts of specific factors that drive pesticide efficacy, such as weather and temperature, and how to find and understand this information from labels.
- Educate growers and pest managers on pesticide application technology, including issues such as calibration and sprayer adjustments based on crop development.
Dormancy and pollination (November–February)

As the days get shorter and the weather gets cooler in the fall, hazelnut trees drop their leaves and go into dormancy. Catkins elongate and female flowers are expressed. Pollination, with the aid of wind, occurs during this timeframe. The ovule is not fertilized until later in the growing season when nut development occurs.

Major pests controlled during dormancy and pollination include bacterial and eastern filbert blight, prevention for Pacific flatheaded borer, general weed management, vole and squirrel management, and moss and lichen control. Moss and lichen do not remove nutrients from the trees, but they collect moisture that increases the weight of the limbs during freezing weather. This can cause limb breakage during heavy, wet snows or ice storms.

Field activities and pest management decisions that occur during dormancy and pollination

- Pruning and destroying pruned wood
- Scouting for disease
- Sanitation
- Flailing leaves
- Postharvest seeding for cover crop

<table>
<thead>
<tr>
<th>PAMS practice</th>
<th>Dormancy and pollination pest management activities</th>
<th>Target pest(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>Cutting out infested wood</td>
<td>Sanitation for Pacific flatheaded borer; sunlight management</td>
</tr>
<tr>
<td></td>
<td>Cleaning and disinfecting pruners</td>
<td>Bacterial blight</td>
</tr>
<tr>
<td>Avoidance</td>
<td>Pruning</td>
<td>Eastern filbert blight, bacterial blight; sunlight management</td>
</tr>
<tr>
<td></td>
<td>Flailing</td>
<td>Insect control (filbert worm)</td>
</tr>
<tr>
<td></td>
<td>Postharvest seeding for cover crop</td>
<td>Weeds</td>
</tr>
<tr>
<td></td>
<td>Chipping and burning pruned wood</td>
<td>Disease and insect control</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Scouting</td>
<td>Eastern filbert blight</td>
</tr>
<tr>
<td>Suppression</td>
<td>Applications of copper-based products and/or lime sulfur</td>
<td>Moss, lichen</td>
</tr>
</tbody>
</table>
Critical needs for pest management during dormancy and pollination

Research topics

- Research the impacts of moss and lichen to determine the need for control.
- Determine best practices for soil conservation.
- Research the impacts of various orchard floor management activities on pesticide losses and run-off.
- Determine best practices for orchard floor management to minimize pesticide losses off site, including mitigations (such as buffers or grass strips).
- Research best sprayer technology to maximize efficacy and minimize drift.
- Research best pruning practices for light management to increase yield.

Regulatory actions

- Address pest management limitations on farms in urban-rural interface areas.

Education

- Educate growers and pest managers on the importance of flailing for pest management and preemergent weed control.
- Educate growers and pest managers on best practices for soil conservation.
- Educate growers and pest managers on pesticide selection and application technology (such as calibration and nozzle selection) to reduce pesticide impacts to water.
- Educate growers (and general public) on the potential to collaborate with municipalities and other organizations on water quality efforts (such as the Eugene Water and Electric Board [EWEB] and the Willamette Valley Drinking Water Protection Program, slated to begin in 2020).
- Educate growers on available soil and water conservation district programs to help minimize erosion, improve soil health, and improve water quality (such as yamhillswcd.org).
- Revive and increase participation in and engagement with the Hazelnut Sustainability Program.
Budbreak to shoot elongation (March–May)

This crop stage begins with bud break in early spring, continues during the spring as leaves unfurl and become fully formed, and ends when nut maturation begins, usually in late June. Bud break is defined as the stage when half of the buds on a tree show a separation of the leaves out of the buds.

Major pests managed during this crop stage include bud mite, aphids, leafroller, scale, flatheaded and shothole borers, eastern filbert blight, weeds (such as annual ryegrass and annual bluegrass), and sucker control. If using mating disruption for filbertworm, that management begins in this stage as well.

Field activities and pest management decisions that occur during budbreak to shoot elongation

- Orchard floor leveling
- Flailing
- Mowing
- Pruning and destroying pruned wood
- Sucker removal
- Trunk painting
- Soil and foliar fertilization
- Boron application to increase nut set
- Pheromone application for mating disruption
- Placing and monitoring traps for filbert worm
- Insecticide, miticide, fungicide, and herbicide applications
- Scouting and counting for aphid thresholds; scouting for parasitism

Photo by Betsy Hartley, © Oregon State University
<table>
<thead>
<tr>
<th>PAMS practice</th>
<th>Budbreak to shoot elongation pest management activities</th>
<th>Target pest(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>Pruning and destroying pruned wood</td>
<td>Diseases</td>
</tr>
<tr>
<td>Avoidance</td>
<td>Set out pheromone baited traps for monitoring (May–June)</td>
<td>Filbertworm</td>
</tr>
<tr>
<td></td>
<td>Apply pheromone dispensers for mating disruption (May–June)</td>
<td>Filbertworm</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Scouting</td>
<td>Eastern filbert blight and bacterial blight</td>
</tr>
<tr>
<td></td>
<td>Scouting and threshold counting</td>
<td>Aphid, leafroller</td>
</tr>
<tr>
<td></td>
<td>Monitoring for parasitoids</td>
<td>Aphid, mites, brown marmorated stink bug</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>Big bud mite</td>
</tr>
<tr>
<td></td>
<td>Leaf analysis for nutrients</td>
<td>Biotic and abiotic stressors</td>
</tr>
<tr>
<td>Suppression</td>
<td>Insecticide applications:</td>
<td>Shothole borer, Pacific flatheaded borer, aphid, leafroller, mites, leafftier</td>
</tr>
<tr>
<td></td>
<td>- Chlorpyrifos (Lorsban)</td>
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<tr>
<td></td>
<td>- Imidacloprid (Admire, etc.)</td>
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<td></td>
<td>- Spinosyns (Spinetoram [Delegate])</td>
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<tr>
<td></td>
<td>- Abamectin (Agri-mek)</td>
<td>Bud mite</td>
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<tr>
<td></td>
<td>Fungicide applications to prevent infection:</td>
<td>Eastern filbert blight</td>
</tr>
<tr>
<td></td>
<td>- Azoxystrobin + propiconazole (Quilt Xcel)</td>
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<tr>
<td></td>
<td>- Chlorothalonil (Bravo, Echo)</td>
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<tr>
<td></td>
<td>- Fluxapyroxad + pyraclostrobin (Merivon)</td>
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<tr>
<td></td>
<td>- Propiconazole (Tilt, Bumper)</td>
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<td></td>
<td>- Propiconazole + trifloxystrobin (Stratego)</td>
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<td></td>
<td>- Pyraclostrobin (Cabrio)</td>
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<td></td>
<td>- Trifloxystrobin (Flint)</td>
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<tr>
<td></td>
<td>- Ziram</td>
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<td>Herbicide applications:</td>
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</tr>
<tr>
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<td>- Indaziflam (Alion)</td>
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<tr>
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<td>- Flumioxazin (Chateau)</td>
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<td></td>
<td>- Glufosinate (Rely)</td>
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<tr>
<td></td>
<td>- Glyphosate (Roundup)</td>
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<tr>
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<td>- Paraquat (Gramoxone)</td>
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</tr>
<tr>
<td></td>
<td>- Diuron (Karmex)</td>
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</tr>
<tr>
<td></td>
<td>- Rimsulfuron (Matrix)</td>
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<tr>
<td></td>
<td>- Carfentrazone (Aim)</td>
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</tr>
<tr>
<td></td>
<td>- Simazine (Princep)</td>
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<tr>
<td></td>
<td>- Pendimethalin (Prowl)</td>
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<tr>
<td></td>
<td>- Oryzalin (surfian) in young orchards</td>
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<td></td>
<td>- Isoxaben (Trellis) in young orchards</td>
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</tr>
<tr>
<td></td>
<td>Squirrel and vole control: trapping, killing</td>
<td>Squirrels, voles</td>
</tr>
</tbody>
</table>
Critical needs for pest management during budbreak to shoot elongation

Research topics

- Evaluate effective fungicides for controlling eastern filbert blight.
- Evaluate the roles of foliar nutrition, soil fertility, and plant stimulants in tree health and pest management.
- Research on weed and resistance management (for example, managing wild carrot or ryegrass effectively without causing resistance).
- Research the impact of herbicides used for sucker control on crop maturity, specifically 2,4-D.

Regulatory actions

- Register more herbicide active ingredients with different modes of action to combat resistance.

Education

- Educate growers and pest managers on the proper use of Ziram for eastern filbert blight control as part of a disease management program.
- Educate growers and pest managers on best management practices for eastern filbert blight.
- Educate growers and pest managers on softer management options for leafroller and other insects to reduce chlorpyrifos use and protect natural enemies.
- Educate growers and pest managers on a mating disruption program for filbertworm.
- Educate growers on weed and resistance management.
Nut development (May–September)

Flowers that have been pollinated during the winter are fertilized near the end of May through June and nut development begins. The nuts continue to grow in size until the kernels are fully mature, sometime during August or September. Mature nuts drop to the ground beginning in September, continuing into October for some cultivars. To prevent damage to the nuts, vehicles and farm equipment are not driven in the orchard at this time.

The orchard floor is prepared for harvest in August. Preparation involves flail mowing to remove weeds and blanks (shells without kernels that drop prematurely) and releveling of the ground by filling in potholes and smoothing out the soil surface.

Main pests managed during this stage include filbertworm, aphids, spider mites, shoethole borer, Pacific flatheaded borer, brown marmorated stink bug, and weed and sucker control. Any pest management must occur before nut drop or after harvest.

Field activities and pest management decisions that occur during nut development

- Pruning (for bacterial blight)
- Irrigation
- Orchard floor management for harvest: leveling, flailing
- Trapping for filbertworm
- Foliar nutrition and fertigation (irrigating with fertilizer)
- Scouting
- Sucker control
<table>
<thead>
<tr>
<th>PAMS practice</th>
<th>Nut development pest management activities</th>
<th>Target pest(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevention</strong></td>
<td>Pruning and destroying pruned wood</td>
<td>Diseases</td>
</tr>
<tr>
<td><strong>Avoidance</strong></td>
<td>Flail mowing</td>
<td>Weeds, insects</td>
</tr>
<tr>
<td></td>
<td>Dragging/leveling</td>
<td>Weeds</td>
</tr>
<tr>
<td></td>
<td>Irrigation for young orchards</td>
<td>Bacterial blight</td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td>Scouting</td>
<td>Aphids, eastern filbert blight, filbertworm, mites, brown marmorated stink bug</td>
</tr>
<tr>
<td></td>
<td>Trapping</td>
<td>Brown marmorated stink bug, filbertworm</td>
</tr>
<tr>
<td><strong>Suppression</strong></td>
<td><strong>Cyfluthrin (Tombstone)</strong></td>
<td>Scale control</td>
</tr>
<tr>
<td></td>
<td><strong>Acetamiprid (Assail)</strong></td>
<td>Aphid</td>
</tr>
<tr>
<td></td>
<td><strong>Imidacloprid</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Flupyradifurone + Propylene carbonate (Sivanto)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Azadirachtin (Aza-Direct) for organic growers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Beta-cyfluthrin (Baythroid)</strong></td>
<td>Filbertworm</td>
</tr>
<tr>
<td></td>
<td><strong>Esfenvalerate (Asana)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Methoxyfenozide (Intrepid)</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>Tebufozide (Confirm)</strong></td>
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</tr>
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<td></td>
<td><strong>Spinosad (Entrust) for organic growers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Pyrethrins (Pyganic) for organic growers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pyrethroid sprays, such as:</strong></td>
<td></td>
<td>Brown marmorated stink bug</td>
</tr>
<tr>
<td></td>
<td><strong>Bifenthrin (Brigade)</strong></td>
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<td></td>
<td><strong>Zeta-cypermethrin (Mustang)</strong></td>
<td></td>
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<td></td>
<td><strong>2,4-D (Saber)</strong></td>
<td>Sucker control</td>
</tr>
<tr>
<td></td>
<td><strong>Carfentrazone (Aim)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Glufosinate (Rely)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Paraquat (Gramoxone)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Rodent control (especially important with intercropping, which can attract rodents)</strong></td>
<td></td>
<td>Rodents</td>
</tr>
<tr>
<td><strong>Trunk sprays: Chlorpyrifos (Lorsban), pyrethroids</strong></td>
<td></td>
<td>Shothole borer, Pacific flatheaded borer</td>
</tr>
</tbody>
</table>
Critical needs for pest management during nut development

Research topics

- Establish treatment thresholds for spider mites and bud mites.
- Determine best practices for irrigation methods that impact various aspects of production, including intercropping, nut fill, bacterial blight and root rot, and harvest (for example, how long before harvest to stop irrigation).
- Research evapotranspiration and water demand to better understand irrigation needs.
- Address the unmet high demand for the brown marmorated stink bug parasitoid; research how to integrate this into a management program (with respect to pesticide risks, efficacy of parasitoid, etc.).
- Research effective control options, chemical and nonchemical, for hard-to-control weeds such as sharp-point fluvellin and knotweed.
- Research best practices for airblast management that improve efficacy and minimize drift.
- Research best practices for application technology, including spray volume and best efficacy for sucker and weed control.
- Research the efficacy of horticultural oils for insect control.
- Research the potential for use of smart sprayers (sensor-equipped sprayers) with airblast application.

Regulatory actions

- Register horticultural oils for use in both organic and conventionally grown hazelnuts.
- Clarify the method for calculating the number of applications per season with respect to spot spraying.

Education

- Educate growers and pest managers on best practices for using horticultural oils for insect control.
- Educate growers and pest managers on alternatives to pyrethroids for filbertworm and other insect control.
- Educate growers and pest managers on using phenology models for timing of control for filbertworm.
- Educate growers and pest managers on the importance of monitoring, and proper monitoring techniques, for filbertworm management.
- Educate growers and pest managers on best practices for drift management, and effective drift reduction technologies.
- Educate growers and pest managers on best application practices for sucker control that maximize efficacy and minimize risks and losses.
Harvest through postharvest
(September–November)

Harvest generally occurs during the month of October but can be slightly earlier or later depending on the weather and cultivar. Leaves are dropping during November, and by the end of November trees are beginning to enter dormancy.

Prior to harvest, during September and early October, nuts have fallen from the tree to the orchard floor. Once a significant number of nuts have fallen, harvest begins. Depending on nut fall and weather, multiple harvests may occur. Nuts are not shaken from trees, as trees would be damaged due to a very thin bark and shallow root system. All commercially grown hazelnuts are harvested mechanically. Harvest is often a two-step operation. First, nuts on the orchard floor are mechanically swept into a windrow between the tree rows. Then a harvesting machine picks up the nuts from the windrow and drops them into a tote box or trailer. The nut harvester also separates out twigs, leaves, and other debris as the nuts are being harvested. The nuts are then transported out of the orchard to a cleaning and drying facility. Newer machines are available which don’t require the “windrowing” stage of sweeping the nuts between tree rows.

Major pests managed during this timeframe include brown marmorated stink bug, kernel mold, and bacterial blight. Growers are also managing for nut quality at this time, which includes managing issues such as mud.

Field activities and pest management decisions that occur during harvest through postharvest

- Postharvest lime applications
- Harvesting

<table>
<thead>
<tr>
<th>PAMS practice</th>
<th>Harvest through postharvest pest management activities</th>
<th>Target pest(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>None at this time</td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>Harvest sooner, before fall rains begin; multiple harvests</td>
<td>Kernel mold</td>
</tr>
<tr>
<td></td>
<td>Processing and drying sooner, and as quickly as possible after harvest</td>
<td>Kernel mold</td>
</tr>
<tr>
<td></td>
<td>Harvesting over a ground cover (helps keep nuts dry)</td>
<td>Kernel mold</td>
</tr>
<tr>
<td>Monitoring</td>
<td>None at this time</td>
<td></td>
</tr>
<tr>
<td>Suppression</td>
<td>Shooting birds and (legal-to-shoot) squirrels</td>
<td>Birds, squirrels</td>
</tr>
<tr>
<td></td>
<td><strong>Fungicide applications:</strong></td>
<td>Bacterial blight</td>
</tr>
<tr>
<td></td>
<td>- <em>Bacillus subtilis</em> (Serenade) (used nonbearing)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Copper-based products</td>
<td></td>
</tr>
</tbody>
</table>
Critical needs for pest management during harvest through postharvest

Research topics

- Research best drying protocols for different varieties to preserve shelf stability.
- Research best practices for postharvest handling to prevent human pathogens.
- Research the biology and best practices for management of kernel mold.
- Develop phenology models to predict harvest timing of different hazelnut cultivars.
- Research products that precipitate/initiate nut fall.

Regulatory actions

- Work to ensure growers have the right to shoot blue birds and Steller’s jays without having to fill out and send in reports of their control.

Education

- Educate growers and pest managers regarding good agricultural practices (GAPs) to ensure food safety during harvest and postharvest.
- Educate growers and pest managers on harvest practices that avoid kernel mold.


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**Activity Tables for Hazelnuts in Washington and Oregon**

Note: An activity may occur at any time during the designated time period but generally not continually during that time period.

### Field Activities (other than pest management)

<table>
<thead>
<tr>
<th>Activity</th>
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<th>Feb</th>
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<th>June</th>
<th>July</th>
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<th>Sept</th>
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<th>Nov</th>
<th>Dec</th>
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</thead>
<tbody>
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<td>Boron application to increase nut set</td>
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### Pest Management Activities

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<td>Pheromone dispensers for mating disruption</td>
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<td>Placement and monitoring of traps for filbertworm</td>
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<td>Pruning for bacterial blight</td>
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<td>Trunk painting</td>
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<td>Vole and squirrel management</td>
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<td></td>
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</tr>
</tbody>
</table>

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Exhibit C-41
## Seasonal Pest Management for Hazelnuts in Oregon and Washington

Note: X = times when pest-management strategies are applied to control these pests, not all times when pest is present.

### Insects and mites

<table>
<thead>
<tr>
<th>Insect/Mite</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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</thead>
<tbody>
<tr>
<td>Aphids (filbert and hazelnut)</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td></td>
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</tr>
<tr>
<td>Borers (Pacific flathead and shothole)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Brown marmorated stink bug</td>
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<td></td>
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</tr>
<tr>
<td>Bud mite</td>
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<td></td>
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<td>Filbert worm (flailing Nov–Feb)</td>
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<td>Leaf-tier</td>
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<td>Scale</td>
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</tr>
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<td>Spider mite</td>
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<td>X</td>
<td>X</td>
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### Diseases and viruses

<table>
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<tr>
<th>Disease</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
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<tbody>
<tr>
<td>Bacterial blight</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Eastern filbert blight</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td>Kernel mold</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
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<td></td>
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<tr>
<td>Lichen and moss</td>
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<td>X</td>
<td>X</td>
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</tr>
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<td>Root rots</td>
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<td>X</td>
<td>X</td>
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### Weeds

<table>
<thead>
<tr>
<th>Weed</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual broadleaves</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Perennial broadleaves</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual grasses</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perennial grasses</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
</tbody>
</table>
Hazelnut Insecticide and Fungicide Risk Management

The letters below represent four categories of nontarget risk potentially affected by pesticide use. If a letter is used, it indicates that mitigation is needed at commonly used application rates in order to reduce risk. Risks were calculated using the risk assessment tool IPM PRiME. This table does not substitute for any mitigations required by the product label.

- **A** = Risks to aquatics: invertebrates and fish
- **T** = Risks to terrestrial wildlife: birds and mammals
- **P** = Risks to pollinators: risk of hive loss
- **B** = Risks to bystanders: e.g., a child standing at the edge of the field

“ND” means no data is available for this product. “–” means that risks are not anticipated for this product. Any product highlighted in yellow is classified as a “highly hazardous pesticide” (HHP) by the World Health Organization and the Food and Agriculture Organization of the United Nations. These products may pose significant risks to human health or the environment, and risk reduction measures may not be effective in mitigating these risks. (Note: See Appendix E, “Herbicide Usage Table” [page 53] for highly hazardous herbicides in use.)

<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Risks requiring mitigation</th>
<th>Preplant through planting</th>
<th>Dormancy and pollination</th>
<th>Bud break to shoot elongation</th>
<th>Nut development</th>
<th>Harvest through post harvest</th>
<th>Establishment and nonbearing</th>
<th>Early bearing</th>
<th>Target pest(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insecticides</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Products marked with ^ are go-to products; those marked with * are considered critical to the industry.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Abamectin (Agri-mek)</td>
<td>A, P</td>
<td></td>
<td></td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bud mite</td>
<td></td>
</tr>
<tr>
<td>Acetamiprid (Assail)</td>
<td>A</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aphids</td>
<td></td>
</tr>
<tr>
<td>Alpha-cypermethrin (Fastac)</td>
<td>A, P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Filbertworm</td>
<td></td>
</tr>
<tr>
<td>Azadirachtin (Aza-Direct)</td>
<td>–</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aphids</td>
<td>Used by organic growers</td>
</tr>
<tr>
<td>Bacterium Bacillus thuringiensis kurstaki (Btk)</td>
<td>–</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Filbertworm, leafroller</td>
<td></td>
</tr>
<tr>
<td><strong>Beta-cyfluthrin (Baythroid)</strong></td>
<td>A, P</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Filbertworm, leaftier</td>
<td></td>
</tr>
<tr>
<td><strong>Beta-cyfluthrin + imidacloprid (Leverage)</strong></td>
<td>A, P</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aphids</td>
<td></td>
</tr>
<tr>
<td>Bifenazate (acramite)</td>
<td>–</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bud mite</td>
<td></td>
</tr>
<tr>
<td>Bifenthrin (Brigade)</td>
<td>A, P</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Brown marmorated stink bug, filbertworm</td>
<td></td>
</tr>
<tr>
<td>Chlorantraniliprole (Altacor)</td>
<td>–</td>
<td></td>
<td></td>
<td>1–2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Filbertworm, leafroller</td>
<td></td>
</tr>
</tbody>
</table>
### Hazelnut Insecticide and Fungicide Risk Management (continued)

<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Risks requiring mitigation</th>
<th>Preplant through planting</th>
<th>Dormancy and pollination</th>
<th>Budbreak to shoot elongation</th>
<th>Nut development</th>
<th>Harvest through post harvest</th>
<th>Establishment and nonbearing</th>
<th>Early bearing</th>
<th>Target pest(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorpyrifos (Lorsban)</td>
<td>A, T, P, B</td>
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<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Brown marmorated stink bug, filbertworm</td>
<td></td>
</tr>
<tr>
<td>Chlorpyrifos + lambda cyhalothrin (Cobalt)</td>
<td>A, T, P, B</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Brown marmorated stink bug, filbertworm</td>
<td></td>
</tr>
<tr>
<td>Clothianiden (Belay)</td>
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<td></td>
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<td>Not used</td>
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<tr>
<td>Cyflumetofen (Nealta)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mites</td>
<td></td>
</tr>
<tr>
<td>Cyfluthrin (Tombstone)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>Filbertworm</td>
<td></td>
</tr>
<tr>
<td>Diflubenzuron (Dimilin)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>Not used</td>
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</tr>
<tr>
<td>Diflubenzuron + lambda cyhalothrin (DoubleTake)</td>
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<td></td>
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<td></td>
<td></td>
<td>New product, not much use</td>
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<tr>
<td>E,E-8, 10-dodecadienyl acetate (Isomate FBW ring) [pheromone]</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Filbertworm Only applied once; lasts whole season</td>
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<tr>
<td>Emamectin benzoate (Proclaim)</td>
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</tr>
<tr>
<td>Esfenvalerate (Asana)*</td>
<td>A, P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1–2</td>
<td>Filbertworm</td>
<td></td>
</tr>
<tr>
<td>Etoxazole (Zeal)</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
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<td>Fenpropathrin (Danitol)</td>
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<td>Fenpyroximate (Fujimite)</td>
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<td>Not used</td>
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<tr>
<td>Flupyradifurone (Sivanto)</td>
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<tr>
<td>Gamma-cyhalothrin (Declare, Proaxis)</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Not used</td>
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<tr>
<td>Hexythiazox (Savey)</td>
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<td></td>
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<tr>
<td>Imidacloprid (Admire Pro, many generics)</td>
<td>A, P</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>Aphids, Pacific flatheaded borer</td>
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## Hazelnut Insecticide and Fungicide Risk Management (continued)

<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Risks requiring mitigation</th>
<th>Preplant through planting</th>
<th>Dormancy and pollination</th>
<th>Budbreak to shoot elongation</th>
<th>Nut development</th>
<th>Harvest through post harvest</th>
<th>Establishment and nonbearing</th>
<th>Early bearing</th>
<th>Target pest(s)</th>
<th>Comments</th>
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<td><strong>Insecticides</strong></td>
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<tr>
<td>Lambda-cyhalothrin (Warrior II, generics)</td>
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<td></td>
<td></td>
<td></td>
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<td>Filbertworm, aphids</td>
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</tr>
<tr>
<td>Lambda-cyhalothrin + thiamethoxam (Endigo)</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>New product, not much use yet</td>
<td></td>
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<tr>
<td>Methoxyfenozide (Intrepid)</td>
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<td></td>
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<td></td>
<td></td>
<td>Filbertworm</td>
<td></td>
</tr>
<tr>
<td>Permethrin (Ambush)</td>
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<td></td>
<td>Not used</td>
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<td>Not used</td>
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<td>Pyriproxyfen (Esteem)</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>Not used</td>
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</tr>
<tr>
<td>Spinetoram (Delegate)</td>
<td>P</td>
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<td></td>
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<tr>
<td>Spinosad (Entrust, Success)</td>
<td>P</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Filbertworm For organic growers</td>
<td></td>
</tr>
<tr>
<td>Spirodiclofen (Envidor)</td>
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<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Fungicides</th>
<th>Number of applications per crop stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: Total fungicide use within rotation for EFB averages 4 apps/season; sometimes up to 6 are used.</td>
<td></td>
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<tr>
<td>Azoxystrobin + difenoconazole (Quadris Top)</td>
<td>A</td>
</tr>
<tr>
<td>Azoxystrobin + propiconazole (QuiltXcel, Aframe Plus)</td>
<td>A</td>
</tr>
<tr>
<td>Bacillus subtilis (Serenade)</td>
<td>–</td>
</tr>
<tr>
<td>Chlorothalonil (Bravo Weather Stik, Echo)</td>
<td>A, T</td>
</tr>
<tr>
<td>Copper hydroxide (Kocide NuCop, Champ)</td>
<td>T</td>
</tr>
</tbody>
</table>
# Hazelnut Insecticide and Fungicide Risk Management (continued)

<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Risks requiring mitigation</th>
<th>Preplant through planting</th>
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<th>Harvest through post harvest</th>
<th>Establishment and nonbearing</th>
<th>Early bearing</th>
<th>Target pest(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper hydroxide + copper oxychloride (Badge X2)</td>
<td>T, P</td>
<td></td>
<td></td>
<td>0–1</td>
<td>1–2</td>
<td>0–1</td>
<td></td>
<td></td>
<td>Bacterial blight</td>
<td></td>
</tr>
<tr>
<td>Cuprous oxide (Nordox 75WG)</td>
<td>P</td>
<td></td>
<td></td>
<td>0–1</td>
<td>1–2</td>
<td>0–1</td>
<td></td>
<td></td>
<td>Bacterial blight</td>
<td></td>
</tr>
<tr>
<td>Copper sulfate (Cuprofix Ultra 40 Disperss)</td>
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<td></td>
<td>0–1</td>
<td>1–2</td>
<td>0–1</td>
<td></td>
<td></td>
<td>Bacterial blight</td>
<td></td>
</tr>
<tr>
<td>Flutriafol (Topguard)</td>
<td>ND</td>
<td>1–2</td>
<td></td>
<td>1–2</td>
<td>1–2</td>
<td>1–2</td>
<td>EFB</td>
<td></td>
<td>Part of rotation</td>
<td></td>
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<tr>
<td>Flutriafol + azoxystrobin (Topguard EQ)</td>
<td>A, ND</td>
<td>1–2</td>
<td></td>
<td>1–2</td>
<td>1–2</td>
<td>1–2</td>
<td>EFB</td>
<td></td>
<td>Part of rotation</td>
<td></td>
</tr>
<tr>
<td>Fluxapyroxad + pyraclostrobin (Merivon)</td>
<td>A</td>
<td>1–2</td>
<td></td>
<td>1–2</td>
<td>1–2</td>
<td>1–2</td>
<td>EFB</td>
<td></td>
<td>Part of rotation</td>
<td></td>
</tr>
<tr>
<td>Peroxyacetic Acid (Oxidate)</td>
<td>–</td>
<td></td>
<td></td>
<td>0–1</td>
<td>1–2</td>
<td>0–1</td>
<td>Bacterial blight</td>
<td></td>
<td>Organic approved</td>
<td></td>
</tr>
<tr>
<td>Propiconazole (Bumper 41.8EC)</td>
<td>–</td>
<td>1–2</td>
<td></td>
<td>1–2</td>
<td>1–2</td>
<td>1–2</td>
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<tr>
<td>Propiconazole (Tilt)</td>
<td>–</td>
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<td>EFB</td>
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</tr>
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<td>Propiconazole + trifloxystrobin (Stratego)</td>
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<td>1–2</td>
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<td>Triflumizole (Procure 480SC)</td>
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<td>A, T, P</td>
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<td>1–2</td>
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<td>EFB</td>
<td></td>
<td>New registration, part of rotation</td>
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**Herbicides**

For herbicide risk classification, see Appendix E, “Herbicide Usage Table,” page 53.
### Efficacy Ratings for INSECT and MITE Management Tools in Hazelnuts

Rating scale: **E** = excellent (90–100% control); **G** = good (80–90% control); **F** = fair (70–80% control); **P** = poor (<70% control); **?** = efficacy unknown in management system—more research needed; *** = effective but not a stand-alone option

<table>
<thead>
<tr>
<th>Management tools</th>
<th>Filbert bud mite (rust mite)</th>
<th>Omnivorous leafhopper</th>
<th>Obliquebanded leafroller (OBLR) and filbert leafroller</th>
<th>Filbertworm</th>
<th>Filbert aphid, hazelnut aphid</th>
<th>Brown marmorated stink bug</th>
<th>Spider mite</th>
<th>Lecanium scale</th>
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<th>Comments</th>
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<td>Abamectin (Agri-mek)</td>
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<td>Bacterium Bacillus thuringiensis kurstaki (Btk)</td>
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<td>Beta-cyfluthrin + imidaclorpid (Leverage)</td>
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<td>Bifenazate (acramite)</td>
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<td>Chlorpyrifos + lambda cyhalothrin (Cobalt)</td>
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<td>Diflubenzuron + lambda cyhalothrin (DoubleTake)</td>
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<td>E,E-8, 10-dodecadienyl acetate (Isomate FBW ring) [pheromone]</td>
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<td>F</td>
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<td>Low use; probably effective against spider mite</td>
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</table>

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Exhibit C-47
## Efficacy Ratings for INSECT and MITE Management Tools in Hazelnuts (continued)

<table>
<thead>
<tr>
<th>Management tools</th>
<th>Filbert bud mite (rust mite)</th>
<th>Omnivorous leaflet</th>
<th>Obliquebanded leafroller (OBLR) and filbert leafroller</th>
<th>Filbertworm</th>
<th>Filbert aphid, hazelnut aphid</th>
<th>Brown marmorated stink bug</th>
<th>Spider mite</th>
<th>Lecanium scale</th>
<th>Borers</th>
<th>Comments</th>
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<tr>
<td>Gamma-cyhalothrin (Declare, Proaxis)</td>
<td></td>
<td></td>
<td>E?</td>
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<td>Hexythiazox (Savey)</td>
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<tr>
<td>Imidacloprid (Admire Pro, many generics)</td>
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<td>E</td>
<td></td>
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<td>G</td>
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<td>Limited experience with borer control</td>
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<td>G</td>
<td>F</td>
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<td>Lambda-cyhalothrin + thiamethoxam (Endigo)</td>
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<td>Expensive but protects beneficials</td>
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<td>Spinosad (Entrust, Success)</td>
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<td>Flupyradifurone (Sivanto)</td>
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<td>Horticultural oil</td>
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<td>Cultural/nonchemical strategies</td>
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<td>Breeding for bud mite resistance</td>
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<td>Biological control for aphids, brown marmorated stink bug</td>
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<td>Filbertworm flailing</td>
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</table>
| Dust management | | | | | | | | | | *
| Habitat management for filbertworm (extra orchard) | | | | | | | | | | *
| Monitoring nonbearing orchards for filbertworm | | | | | | | | | | *
| Orchard floor management | | | | | | | | | | *
Efficacy Ratings for DISEASE and PATHOGEN Management Tools in Hazelnuts

Rating scale: **E** = excellent (90–100% control); **G** = good (80–90% control); **F** = fair (70–80% control); **P** = poor (< 70% control); **?** = efficacy unknown, more research needed

<table>
<thead>
<tr>
<th>Management tools</th>
<th>Eastern filbert blight</th>
<th>Bacterial blight</th>
<th>Root rots: phytophthora and armillaria</th>
<th>Wood decay</th>
<th>Lichen and moss</th>
<th>Trunk cankers and branchdieback (not EFB)</th>
<th>Kernel molds</th>
<th>Comments</th>
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<td>Azoxystrobin (Abound)</td>
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<tr>
<td>Azoxystrobin + difenoconazole (Quadris Top)</td>
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<td>Azoxystrobin + propiconazole (Quilt, Aframe Plus)</td>
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<td>Bacillus subtilis (Serenade)</td>
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<td>Copper ammonium carbonate (Copper-Count-N)</td>
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<td>Was used; not often used now</td>
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<td>Copper hydroxide (Kocide NuCop, Champ)</td>
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<td>F</td>
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<td>Copper hydroxide + copper oxychloride (Badge X2)</td>
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<td>Copper oxychloride + copper sulfate (C-O-C-S WDG)</td>
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<td>Copper sulfate (Cuprofix Ultra 40 Disperss)</td>
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<td>Not much use</td>
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<td>Flutriafol (Topguard)</td>
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<td>Flutriafol + azoxystrobin (Topguard EQ)</td>
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<td>Not much use</td>
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<td>Fluxapyroxad + pyraclostrobin (Merivon)</td>
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<td>Metconazole (Quash)</td>
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<td>Peroxyacetic Acid (Oxidate)</td>
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<td>Polyoxin-D (PhD)</td>
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<td>Propiconazole (Bumper 41.8EC)</td>
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Efficacy Ratings for DISEASE and PATHOGEN Management Tools in Hazelnuts (continued)

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<th>Management tools</th>
<th>Eastern filbert blight</th>
<th>Bacterial blight</th>
<th>Root rots: Phytlophthora and Armillaria</th>
<th>Wood decay</th>
<th>Lichen and moss</th>
<th>Trunk cankers and branch dieback (not EFB)</th>
<th>Kernel molds</th>
<th>Comments</th>
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<tr>
<td>Triflumizole (Procure 480SC)</td>
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<tr>
<td>Ziram</td>
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**Cultural/nonchemical strategies**

<p>| | | | | | | | | | | |</p>
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<td>Prior to bud break</td>
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<tr>
<td>Cultivar selection</td>
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<td>?</td>
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<td>G</td>
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<td>Irrigation of young orchards</td>
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<td>G</td>
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<td></td>
<td>F</td>
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<td>Irrigation is better</td>
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<td>Multiple harvests</td>
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<td>Pruning</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td></td>
<td>?</td>
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<td></td>
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<td>Must be integrated with other tactics</td>
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<td>Shallow planting</td>
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<td>G</td>
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</table>
# Efficacy Ratings for WEED Management Tools in Hazelnuts

**Rating scale:**

- **E** = excellent (90–100% control);
- **G** = good (80–90% control);
- **F** = fair (70–80% control);
- **P** = poor (<70% control);
- **?** = efficacy unknown—more research needed

*Note: Weed size or stage of growth is an important consideration with most postemergence herbicides.*

In the “Pre/Post” column, **Pre** = soil-active against preemerged weeds; **Post** = foliar-active against emerged weeds.

<table>
<thead>
<tr>
<th>Management tools</th>
<th>PRE/POST</th>
<th>Annual broadleaves (knotweed, fluvelin, groundsel)</th>
<th>Perennial broadleaves (field bindweed, Canada thistle, blackberry)</th>
<th>Annual grasses (barnyard grass, crabgrass, ryegrass, bluegrass, foxtail)</th>
<th>Perennial grasses (quackgrass)</th>
<th>Horsetail</th>
<th>Wild carrot</th>
<th>Nutsedge</th>
<th>Wild garlic</th>
<th>Comments</th>
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</tr>
<tr>
<td>2,4-D (Saber)</td>
<td>POST</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>Used for sucker control or tank mixed</td>
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</tr>
<tr>
<td>Acetic acid (Weed Pharm)</td>
<td>POST</td>
<td></td>
<td></td>
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<tr>
<td>Carfentrazone (Aim)</td>
<td>POST</td>
<td>P</td>
<td>F</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>Better on other species</td>
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<td>Clethodim (Select Max)</td>
<td>POST</td>
<td>E</td>
<td>F</td>
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<td>Resistance issues in grasses</td>
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<tr>
<td>Dichlobenil (Casoron)</td>
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<tr>
<td>Diquat (Reglone)</td>
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<tr>
<td>Diuron (Karmex)</td>
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<td>G</td>
<td>G</td>
<td>?</td>
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<td></td>
<td>Resistance issues in grasses</td>
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<tr>
<td>Flazasulfuron (Mission)</td>
<td>PRE/POST</td>
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<td></td>
<td></td>
<td></td>
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<td>New product, expensive, limited use</td>
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<tr>
<td>Fluazifop (Fusilade)</td>
<td>POST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not commonly used; nonbearing</td>
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<tr>
<td>Flumioxazin (Chateau)</td>
<td>PRE</td>
<td>P</td>
<td>?</td>
<td>F</td>
<td>?</td>
<td></td>
<td></td>
<td>Not commonly used</td>
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<tr>
<td>Glufosinate (Rely)</td>
<td>POST</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>Resistance issues in grasses</td>
<td></td>
</tr>
<tr>
<td>Glyphosate (Roundup)</td>
<td>POST</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>P</td>
<td>Resistance issues in grasses</td>
<td></td>
</tr>
<tr>
<td>Halosulfuron (Sandea)</td>
<td>POST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>Costly, narrow spectrum of weeds controlled</td>
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<tr>
<td>Indaziflam (Alion)</td>
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<td>P</td>
<td>E</td>
<td>P</td>
<td>?</td>
<td>P</td>
<td>P</td>
<td>Costly</td>
<td></td>
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<td>Isoxaben (Trellis, Gallery)</td>
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<td></td>
<td></td>
<td>Costly, never used</td>
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<tr>
<td>Napropramide (Devrinol)</td>
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<td>Never used</td>
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Efficacy Ratings for WEED Management Tools in Hazelnuts (continued)

<table>
<thead>
<tr>
<th>Management tools</th>
<th>PRE/POST</th>
<th>Annual broadleaves (knotweed, fluellen, groundsel)</th>
<th>Perennial broadleaves (field bindweed, Canada thistle, blackberry)</th>
<th>Annual grasses (barnyard grass, crabgrass, ryegrass, foxtail)</th>
<th>Perennial grasses (quackgrass)</th>
<th>Horsetail</th>
<th>Wild carrot</th>
<th>Nutsedge</th>
<th>Wild garlic</th>
<th>Comments</th>
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<td>Never used</td>
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<td>Safe on new trees</td>
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<td>Oxyfluorfen (Goal Tender)</td>
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<td>G</td>
<td>G</td>
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<td>Less expensive option</td>
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<td>E</td>
<td>P</td>
<td>G</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>Used often, resistance issues with grasses</td>
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<td>Pendimethalin (Prowl)</td>
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<td>G</td>
<td>G</td>
<td>P</td>
<td>P</td>
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<td></td>
<td>P</td>
<td></td>
<td>Used on young trees</td>
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<td>Pyraflufen (Venue)</td>
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<td></td>
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<td>Expensive, used in tank mix</td>
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<td>New product; little experience</td>
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<td>P</td>
<td>P</td>
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<td>P</td>
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<td>G</td>
<td>G</td>
<td>G</td>
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<td>Not commonly used; ornamental</td>
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<td>Flail mowing</td>
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<td>Used but not a stand-alone tool</td>
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<td>Leveling (tillage)</td>
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<td>Used but not a stand-alone tool</td>
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</tbody>
</table>
# Appendix E

## Herbicide Usage Table

The following table includes herbicides used, their associated risk classification (described below), their herbicide mechanism of action group number according to the Weed Science Society of America (WSSA), and information regarding timing of use.

For the “Risks Requiring Mitigation” column, the letters indicated represent four categories of non-target risk potentially affected by pesticide use. If a letter appears, it indicates that mitigation is needed at commonly used application rates in order to reduce risk.

- **A** = Risks to aquatics: invertebrates and fish
- **T** = Risks to terrestrial wildlife: birds and mammals
- **P** = Risks to pollinators: risk of hive loss
- **B** = Risks to bystanders: e.g., a child standing at the edge of the field

“ND” means no data is available for this product. “–” means that risks are not anticipated for this product.

Risks were calculated using the risk assessment tool IPM PRiME. This table does not substitute for any mitigations required by the product label. Any product highlighted in yellow is classified as a “highly hazardous pesticide” (HHP) by the World Health Organization and the Food and Agriculture Organization of the United Nations. These products may pose significant risks to human health or the environment, and risk reduction measures may not be effective in mitigating these risks.

Note: In “Activity” column, Pre = soil-active against preemerged weeds; Post = foliar-active against emerged weeds.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Risks requiring mitigation</th>
<th>WSSA group</th>
<th>Activity</th>
<th>Remarks</th>
<th>Minimum age</th>
<th>Crop age when product is used</th>
<th>Time of year (number of applications expected in a given season)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D (Saber)</td>
<td>–</td>
<td>4</td>
<td>POST</td>
<td>bearing</td>
<td>12months</td>
<td>X X X X X X X</td>
<td>1 1-4</td>
</tr>
<tr>
<td>Acetic acid (Weed Pharm)</td>
<td>–</td>
<td></td>
<td>POST</td>
<td>bearing</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Caprylic acid (Suppress EC)</td>
<td>ND</td>
<td></td>
<td>POST</td>
<td></td>
<td></td>
<td>X X X X X</td>
<td>3-4</td>
</tr>
<tr>
<td>Carfentrazone (Aim)</td>
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<td>14</td>
<td>POST</td>
<td>bearing</td>
<td></td>
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<tr>
<td>Clethodim (Select Max)</td>
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<td>POST</td>
<td>non-bearing planting</td>
<td>new plants</td>
<td>X X</td>
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<td>Dichlobenil (Casoron)</td>
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<td>20</td>
<td>PRE</td>
<td>bearing</td>
<td>planting</td>
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<tr>
<td>Diquat (Reglone)</td>
<td>T</td>
<td>22</td>
<td>POST</td>
<td>non-bearing planting</td>
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### Herbicide Usage Table (continued)

<table>
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<th>Herbicide</th>
<th>Risks requiring mitigation</th>
<th>WSSA group</th>
<th>Activity</th>
<th>Remarks</th>
<th>Minimum age</th>
<th>Crop age when product is used</th>
<th>Time of year (number of applications expected in a given season)</th>
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<tr>
<td>Diuron (Karmex)</td>
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<td>7</td>
<td>PRE</td>
<td>bearing</td>
<td>12 months</td>
<td>X</td>
<td>1 1</td>
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<tr>
<td>Fluazifop (Fusilade)</td>
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<td>POST</td>
<td>non-bearing</td>
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<tr>
<td>Flumioxazin (Chateau)</td>
<td>ND</td>
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<td>PRE/POST</td>
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<td>12 months</td>
<td>X</td>
<td>1 2</td>
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<td>Glufosinate (Rely)</td>
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<td>bearing</td>
<td>new plants</td>
<td>X</td>
<td>X</td>
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<td>Glyphosate (Roundup)</td>
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<td>POST</td>
<td>bearing</td>
<td>new plants</td>
<td>X</td>
<td>1 1 1</td>
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<tr>
<td>Halosulfuron (Sandea)</td>
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<td>1 1 2</td>
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<td>Indaziflam (Alion)</td>
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<td>PRE</td>
<td>bearing</td>
<td>12 months</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Isoxaben (Trellis, Gallery)</td>
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<td>21</td>
<td>PRE</td>
<td>bearing</td>
<td>new plants</td>
<td>X</td>
<td>1 2</td>
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<td>Napropamide (Devrinol)</td>
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<td>PRE</td>
<td>bearing</td>
<td>planting</td>
<td>X</td>
<td>1 2</td>
</tr>
<tr>
<td>Norflurazon (Solicam)</td>
<td>A, T</td>
<td>12</td>
<td>PRE</td>
<td>bearing</td>
<td>6 months</td>
<td>X</td>
<td>1 2</td>
</tr>
<tr>
<td>Oryzalin (Surflan)</td>
<td>A, T</td>
<td>3</td>
<td>PRE</td>
<td>bearing</td>
<td>planting</td>
<td>X</td>
<td>1 2</td>
</tr>
<tr>
<td>Oxyfluorfen (Goal Tender)</td>
<td>A, T</td>
<td>14</td>
<td>PRE/POST</td>
<td>bearing</td>
<td>planting</td>
<td>X</td>
<td>1 2</td>
</tr>
<tr>
<td>Paraquat (Gramoxone)</td>
<td>22</td>
<td>POST</td>
<td>bearing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>1 2</td>
</tr>
<tr>
<td>Pendimethalin (Prowl)</td>
<td>T</td>
<td>3</td>
<td>PRE</td>
<td>bearing</td>
<td>planting</td>
<td>X</td>
<td>1 1</td>
</tr>
<tr>
<td>Pyraflufen (Venue)</td>
<td>-</td>
<td>14</td>
<td>POST</td>
<td>bearing</td>
<td>planting</td>
<td>X</td>
<td>1 1</td>
</tr>
</tbody>
</table>
### Herbicide Usage Table (continued)

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate</th>
<th>Application</th>
<th>Growth Stage</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rimsulfuron (Matrix)</td>
<td>-</td>
<td>2</td>
<td>PRE/POST</td>
<td>12 months</td>
</tr>
<tr>
<td>Saflufenacil (Treevix)</td>
<td>-</td>
<td>14</td>
<td>POST</td>
<td>9 months</td>
</tr>
<tr>
<td>Simazine (Princep)</td>
<td>T</td>
<td>5</td>
<td>PRE</td>
<td>12 months</td>
</tr>
<tr>
<td>Sulfentrazone (Zeus)</td>
<td>T</td>
<td>14</td>
<td>PRE</td>
<td>12 months</td>
</tr>
<tr>
<td>Trifluralin (Treflan)</td>
<td>T</td>
<td>3</td>
<td>PRE</td>
<td>non-bearing planting new plants</td>
</tr>
<tr>
<td>Sethoxydim (Poast)</td>
<td>-</td>
<td>1</td>
<td>POST</td>
<td>bearing</td>
</tr>
</tbody>
</table>

Exhibit C-55

RFP Page 78
Using PAMS Terminology

This system of terminology for IPM was developed for use by U.S. Federal agencies seeking to support adoption of IPM by farmers. The table below summarizes common tactics used in agricultural IPM using a “Prevention, Avoidance, Monitoring, Suppression” (PAMS) classification. We also define (in italics) the ecological purpose that lies behind a particular practice. The PAMS tables throughout the text provide a simple basis for surveying practices that are used at different crop growth stages in terms of their contribution to a comprehensive IPM program.

**PREVENTION**

*Prevent introduction to the farm*
- Pest-free seeds, transplants

*Prevent reservoirs on the farm*
- Sanitation procedures
- Eliminate alternative hosts
- Eliminate favorable sites in and off crop

*Prevent pest spread between fields on the farm*
- Cleaning equipment between fields

*Prevent pests developing within fields on the farm*
- Irrigation scheduling to prevent disease development
- Prevent weed reproduction
- Prevent pest-susceptible perennial crops by avoiding high-risk locations

**AVOIDANCE**

*Avoid host crops for the pest*
- Crop rotation

*Avoid pest-susceptible crops*
- Choose genetically resistant cultivars
- Choose cultivars with growth and harvest dates that avoid the pest
- Place annual crops away from high-risk sites for pest development (even parts of a field)

*Avoid crop being the most attractive host*
- Trap cropping
- Use of pheromones
- Use crop nutrition to promote rapid crop development

*Avoid making the crop excessively nutritious*
- Use nutrition to promote rapid crop development
- Avoid excessive nutrients that benefit the pest

*Avoid practices that increase the potential for pest losses*
- Narrow row spacing
- Optimized in-row plant populations
- No-till or strip till

**MONITORING**

*Collect pests*
- Scouting and survey approaches
- Traps

*Identify pests*
- Use of identification guides, diagnostic tools and diagnostic laboratories

*Identify periods or locations of high pest risk*
- Use weather-based pest-development and risk models
- Use soil and plant nutrient testing

*Determine status and trends in pest risks and classify pest severity*
- Maintain pest records over time for each field

*Minimize pest risks over time*
- Plan an appropriate PAMS IPM strategy, based upon pest status and trends

*Determine interventions based upon risks and economics*
- Use of decision-support tools, economic thresholds

**SUPPRESSION**

*CULTURAL*
- Outcompete the pest with other plants
  - Cover crops
- Suppress pest growth
  - Mulches
- Suppress pest with chemicals from crops or other plantings
  - Bio-fumigant crops

*PHYSICAL*
- Physically injure pest or disrupt pest growth
  - Cultivation
  - Mowing
  - Flaming
  - Temperature management
  - Exclusion devices

*BILOGICAL*
- Physically remove pests
  - Mass trapping
  - Hand weeding

- Suppress pest reproduction
  - Pheromones
  - Increase pest mortality from predators, parasites, and pathogens
  - Conservation biological control
  - Inundative release and classical biological control
  - Use of pest antagonists

- Use of least-risk, highest-efficacy pesticides
  - Use economic thresholds to determine that pesticide use is economically justified
  - Use pesticides as a last resort, as part of a PAMS IPM strategy

Table: Paul Jepson, IPPC Oregon State University, paul.jepson@oregonstate.edu
Appendix G

Pesticide Risk Classification

Paul Jepson, Oregon State University

The pesticide risk analysis is based on the Oregon State University Integrated Plant Protection Center’s state-of-the-science risk assessment tool IPM PRiME, a risk model that identifies moderate to high (10% or greater) risk (Jepson et al., 2014, Sustainable Agriculture Network 2017). We analyzed a total of 800 pesticides, and 168 of these posed risks to human workers and bystanders, aquatic life, wildlife, and pollinators. The analysis is intended to provide guidance that is supplementary to the label, which is the primary source of risk management information and mandatory practices.

1. Risk to aquatic life

Pesticides qualified for this risk category if one or more IPM PRiME aquatic risk models (aquatic algae, aquatic invertebrates, or fish chronic risk) exhibited high risk at a typical application rate.

2. Risk to terrestrial wildlife

Pesticides qualified for this risk category if one or more IPM PRiME terrestrial risk models (avian reproductive, avian acute, or small mammal risk) exhibited high risk at a typical application rate.

3. Risk to pollinators

Pesticides were selected based on a widely-used hazard quotient (HQ) resulting of pesticide application rate in g a.i./ha, and contact LD50 for the honey bee (Apis mellifera). Values of HQ < 50 have been validated as low risk in the European Union, and monitoring indicates that products with an HQ > 2,500 are associated with a high risk of hive loss. The HQ value used by IPPC is > 350, corresponding to a 15% risk of hive loss. The quotient includes a correction for systemic pesticides, where risks to bees are amplified.

4. Inhalation risk

Inhalation risk to bystanders was calculated using the ipmPRiME model for inhalation toxicity (Jepson et al., 2014) calculated on the basis of child exposure and susceptibility. This index is protective for workers who may enter fields during or after application, and also bystanders.
MEMORANDUM OF AGREEMENT
BETWEEN WILLAMALANE PARK & RECREATION DISTRICT
AND
THE OREGON STATE HISTORIC PRESERVATION OFFICE
REGARDING THE REMOVAL AND REPLACEMENT OF HAZELNUT ORCHARDS
AT DORRIS RANCH, LANE COUNTY, OREGON

WHEREAS, Willamalane Park & Recreation District (Willamalane) proposes to remove historic hazelnut trees at Dorris Ranch, Lane County, Oregon that are susceptible to damage from hazelnut blight, and to replace them incrementally over the next 20 years with a blight-resistant variety of hazelnut (project); and

WHEREAS, Dorris Ranch is historic hazelnut farm, listed in the National Register of Historic Places; and

WHEREAS, Willamalane consulted with the Oregon State Historic Preservation Office (SHPO) in accordance Oregon Revised Statute (ORS) 358.653; and

WHEREAS, the hazelnut orchards and hazelnut trees to be removed are themselves contributing elements to the historic Dorris Ranch, demonstrating revolutionary techniques associated with late-nineteenth and early-twentieth century hazelnut cultivation; and

WHEREAS, Willamalane determined, and the SHPO concurred that the proposed action represents an adverse effect to the historic Dorris Ranch; and

WHEREAS, the SHPO acknowledges that the project is necessary in order to continue hazelnut cultivation at the Dorris Ranch;

NOW, THEREFORE, Willamalane and the SHPO agree that will ensure that the following stipulations are implemented to resolve the adverse effects of the overall long-term project:

I. STIPULATIONS

A. Willamalane will maintain existing hazelnut trees comprising one hazelnut orchard of the currently-existing eleven orchards, in order to preserve some of the original character-defining features of the hazelnut cultivation that took place at Dorris Ranch historically, as well as to provide a living example of the techniques employed there for interpretive purposes. Re-planted orchards will maintain the overall boundaries of the existing orchards.
B. Willamalane will develop and install in a prominent location on the Dorris Ranch property a minimum of two (2) interpretive panels, constructed of durable materials suitable for outdoor installation. Panels will each be a minimum of 24” x 48” and will provide information regarding the history of the Dorris Ranch, the aspects for which the Dorris Ranch is listed in the National Register of Historic Places, the ways in which those aspects are represented by the historic orchards remaining at the ranch, and a discussion of the reasons why the orchards are being replaced. Panels will be attractive, and include a combination of narrative text and historic and modern photos, sufficient to convey the information outlined above. Draft text and layout will be provided to the SHPO for review and comment. Once SHPO approval has been provided, Willamalane may move forward with installation.

Stipulation B will be completed within one (1) year of the date of the final signature of this document. Completion shall be confirmed by submission of photos of or electronic links to (as appropriate) the completed work, sent electronically to the SHPO. The panels shall remain in place, maintained in good condition for the life of this agreement, at a minimum.

C. Willamalane will develop a narrative related to the content of the panels, and provide that narrative to docents for incorporation into oral presentations and tours.

II. INTERIM COMMUNICATION
Due to the long timelines involved in the execution of the undertaking, during the life of this MOA, Willamalane will provide to the SHPO annual reports and communication as specified below.

1. Correspondence and Meetings
   a. Willamalane will ensure that Stipulation A is completed by submitting an annual report on the anniversary of the final signature of this document, briefly outlining the progress made in replacing trees during the previous year. The annual report will include:
   b. A brief narrative identifying the orchard being preserved per Stipulation A and the orchard removed during the previous year.
   c. A brief narrative identifying any orchard removal planned for the coming year.
   d. A brief statement of the overall progress of the long-term orchard replacement to date.
   e. An annually updated map/aerial image of the Dorris Ranch orchards indicating which orchards have been replaced and when, and which will be replaced in the coming year.
   f. Willamalane will invite SHPO to meet (in person or in a phone meeting, as agreed by the Signatories) at a date 5 years from the date of final signature of the MOA.
At the meeting, the Consulting Parties shall discuss the progress on the overall project and the MOA’s effectiveness.

III. **DURATION**
This MOA will expire if its terms are not carried out within ten (10) years from the date of its execution. Prior to such time, Willamalane may consult with the SHPO to reconsider the terms of the MOA and amend it in accordance with Section III, below. If this agreement expires without amendment prior to completion of the stipulations above, it shall be considered terminated, according to Section IV, below.

IV. **AMENDMENTS & EXTENSIONS**
This MOA may be amended or extended when such an amendment or extension is agreed to in writing by both signatories. The amendment will be effective on the date of the final signature on the amended MOA.

V. **TERMINATION**
If either signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other party to attempt to develop an amendment per Section III, above. If within 30 days (or another time period agreed to by all signatories) an amendment cannot be reached, either signatory may terminate the MOA upon written notification of the other signatory.

Once the MOA is terminated, and prior to work continuing on the Undertaking, Willamalane must enter into a new agreement with the SHPO to adequately mitigate the adverse effect, taking into account any mitigation effort that may have already been completed under this MOA.

VI. **EXECUTION**
Execution of the MOA by Willamalane and the SHPO and the implementation of its stipulations as outlined herein shall constitute evidence that Willamalane has taken into account the effects of the action on historic properties, as required by ORS 358.653.
Signatories

Willamalane Park & Recreation District

By: Robert W. Keefer
Superintendent
Willamalane Park & Recreation District

Date: 3-2-16

Oregon State Historic Preservation Office

By: Christine Curran
Deputy State Historic Preservation Officer
Oregon Parks and Recreation Department

Date: 3-2-16
EXHIBIT E

PROPOSER CERTIFICATIONS

SECTION I
REQUEST AND AUTHORIZATION TO RELEASE INFORMATION, RELEASE OF LIABILITY/CLAIMS AND AGREEMENT NOT TO SUE

(This Form Will Be Provided To References)

To Whom It May Concern:

I, the undersigned, have submitted a proposal to a Request for Proposals (“RFP”) to contract with the Willamalane Park and Recreation District (“WPRD”). I request and authorize you to furnish to WPRD any and all information you may have regarding my employment or my firm’s employment, including but not limited to, evaluations or assessments of my/my firm’s work performance and qualifications.

I request and authorize you to provide the information requested or to participate in a phone or in-person interview with a representative of WPRD.

In consideration of your cooperation with this request, I hereby release you, and any and all other persons employed by or connected with your firm, WPRD and/or organization from any and all liability and/or claims now or in the future arising from the furnishing of any information, including good faith expressions of opinion, to WPRD as requested. I further agree not to sue WPRD, you, or any and all other persons employed by or connected with your firm/WPRD/organization as a result of the furnishing of any information, including good faith expressions of opinion, to WPRD.

I am aware and understand that the information and good faith opinions furnished to WPRD pursuant to this request will remain confidential with WPRD if requested by you, and will not be disclosed to me or to any other person, except as required by law.

The individual signing on behalf of Proposer hereby accepts all terms and conditions contained in the foregoing Request and Authorization to Release Information:

______________________________  ______________________________
Signature of Authorized Representative  Date

______________________________
Name of Firm
Note: Photocopy or Fax reproduction of this request shall be for all intents and purposes as valid as the original. You may retain this form for your files.

SECTION II
PROFESSIONAL LICENSING AND/OR CERTIFICATION

A. CONSULTANT AND SUBCONTRACTOR AND/OR SUB-CONSULTANT

1. At the time Proposer submits its Proposal, the Proposer and any subcontractor and/or sub-consultant Proposer intends to use for the project, shall hold a valid, current professional license and/or certification as required by law for Proposer’s/subcontractor’s/sub-consultant’s profession. FAILURE TO COMPLY WITH THIS REQUIREMENT SHALL RESULT IN PROPOSAL REJECTION.

2. Proposers shall provide any applicable registration/license/certification numbers below:

   1. FOR WHOM: _______________
      REGISTRATION NO.: _______________
      EXPIRATION DATE NO.: _______________
   2. FOR WHOM: _______________
      REGISTRATION NO.: _______________
      EXPIRATION DATE NO.: _______________
   3. FOR WHOM: _______________
      REGISTRATION NO.: _______________
      EXPIRATION DATE NO.: _______________

Include additional information in an attachment to this Certification as necessary.

SECTION III
ADDENDA ACKNOWLEDGEMENT

A. WPRD reserves the right to make changes to the RFP and the resulting Contract, by written Addendum, prior to the deadline for submissions. Addenda will be posted on WPRD’s website. WPRD is not responsible for a Proposer’s failure to receive any addenda. Addenda shall only be issued by WPRD and upon issuance are incorporated into the RFP or the resulting contract. If required by the Addendum, Proposers shall sign and return the Addendum prior to the deadline for submissions.
EXHIBIT E

B. By Proposer's signature on its Proposal, Proposer ACKNOWLEDGES, AGREES and CERTIFIES TO THE FOLLOWING:

1. If any Addenda are issued in connection with this RFP, Proposer has received and duly considered such Addenda, and has completed the blanks below identifying all Addenda issued, and acknowledgment and agreeing to the terms of all such Addenda as those terms revise the terms, conditions, Product Requirements, or Technical Specifications associated with this RFP.

   ADDENDA: No. ________ to No. ________ inclusive.

2. IN ADDITION to completing the blanks above to identify all Addenda, if any, issued under this RFP, Proposer shall sign and return any Addendum that states that it must be signed and returned.

SECTION IV
RESPONSIBILITY INQUIRY/ CONTRACTOR REFERENCES

A. WPRD reserves the right, pursuant to OAR 137-047-0500 and OAR 137-047-0600 to investigate and evaluate, at any time prior to award and execution of the Contract, the apparent successful Contractor's responsibility to perform the Contract. Submission of a signed Proposal shall constitute approval for WPRD to obtain any information WPRD deems necessary to conduct the evaluation. of any other documentation required, which may include, but is not limited to, recent profit-and-loss history; current balance statements; assets-to-liabilities ratio, including number and amount of secured versus unsecured creditor claims; availability of short and long-term financing; bonding capacity; credit information; material; equipment; facility and personnel information; performance record; WPRD shall notify the apparent successful Proposer, in writing, etc. Failure to promptly provide this information shall result in Proposal rejection.

B. WPRD may postpone the award of the Contract after announcement of the apparent successful Proposer in order to complete its investigation and evaluation. Failure of the apparent successful Proposer to demonstrate responsibility shall render the Proposer nonresponsible and shall constitute grounds for Proposal rejection, as required under OAR 137-047-0500.

SECTION V
RECYCLED PRODUCTS

A. Contractors shall use recyclable materials to the maximum extent economically feasible in the performance of the Contract Work set forth in this RFP. ORS 279A.010(1)(ii) states: "'Recycled product' means all materials, goods and supplies, not less than 50 percent of the total weight of which consists of secondary and postconsumer waste with not less than 10 percent of total weight consisting of post-consumer waste. 'Recycled product' also includes any product that could have been disposed of as a solid waste, having completed its life cycle as a consumer item, but otherwise is refurbished for reuse without substantial alteration of the product's form."
EXHIBIT E

ORS 279A.010(1)(u) states: "'Post-consumer waste' means a finished material which would normally be disposed of as solid waste, having completed its life cycle as a consumer item. 'Post-consumer waste' does not include manufacturing waste."

ORS 279A.010(1)(jj) states: "'Secondary waste materials' means fragments of products of finished products of a manufacturing process which has converted a virgin resource into a commodity of real economic value, and includes post-consumer waste, but does not include excess virgin resources of the manufacturing process. For paper, 'secondary waste materials' does not include fibrous waste generated during the manufacturing process such as fibers recovered from waste water or trimmings of paper machine rolls, mill broke, wood slabs, chips, sawdust, or other wood residue from a manufacturing process. "ORS 279A.010(1)(hh) states: "'Recycled PETE product' means a product containing postconsumer polyethylene terephthalate material."

B. By my signature on this Proposal, I hereby affirm that Proposer will comply with the above recycled products provision.

SECTION VI
FOREIGN CONTRACTOR

If the amount of the Contract exceeds ten thousand dollars ($10,000), and if Contractor is not domiciled in or registered to do business in the State, Contractor shall promptly provide to the Oregon Department of Revenue all information required by that Department relative to the Contract. The State shall be entitled to withhold final payment under the Contract until Contractor has met this requirement.

SECTION VII
CERTIFICATION OF COMPLIANCE WITH TAX LAWS

By my signature on this Proposal, I hereby attest or affirm under penalty of perjury: That I am authorized to act on behalf of the Contractor in this matter, that I have authority and knowledge regarding the payment of taxes, and that Contractor is, to the best of my knowledge, not in violation of any Oregon Tax Laws. For purposes of this certification, "Oregon Tax Laws" means a state tax imposed by ORS 401.792 to 401.816, ORS Chapters 118, 314, 316, 317, 318, 320, 321, 323 and the elderly rental assistance program under ORS 310.630 to 310.706, and any local taxes administered by the Department of Revenue under ORS 305.620.

SECTION VIII
CERTIFICATION OF COMPLIANCE WITH NON-DISCRIMINATION LAWS

By my signature on this Proposal, I hereby attest or affirm under penalty of perjury: that I am authorized to act on behalf of Proposer/Contractor in this matter, and to the best of my knowledge Proposer/Contractor has not discriminated and will not discriminate against a subcontractor in the awarding of a subcontract because a subcontractor is a minority, women or emerging small business enterprise, certified under ORS 200.055, or against a business enterprise that is owned or controlled by or that employs a disabled veteran as defined in ORS 408.225.
SECTION VIII
CERTIFICATION OF RESIDENCY

ORS 279A.120 states “In determining the lowest responsible bidder, a public contracting agency shall, for the purpose of awarding the contract, add a percent increase on the bid/proposal of a non-resident bidder equal to the percent, if any, of the preference given to the bidder in the state in which the bidder resides.”

“Resident bidder” means a bidder that has paid unemployment taxes or income taxes in this state during the twelve (12) calendar months immediately preceding submission of the bid, has a business address in this state and has stated in the bid whether the bidder is a “resident bidder”.

“Non-resident bidder” means a bidder who is not a “resident bidder” as defined above.

a. Check one: Bidder is a ( ) resident bidder ( ) non-resident bidder

b. If a resident bidder, enter your Oregon business address:

____________________________________________________

____________________________________________________

c. If a non-resident bidder, enter your state of residency:

___________________________

d. If a non-resident bidder, do you or your firm receive, or are you or your firm eligible for, any preference in award of contracts with your state’s government or with other governmental bodies in your state.

Check one: ☑ yes ☐ no

If yes, state your preference percentage: ______________ %

If yes, but not a percentage of bid/proposal price, describe the preference:

____________________________________________________________________

____________________________________________________________________

If yes, state the law or regulation that allows the preference described (legal citation):

____________________________________________________________________

________________________________________________________
EXHIBIT E

SECTION X
SIGNATURE OF PROPOSER’S DULY AUTHORIZED REPRESENTATIVE

THIS PROPOSAL MUST BE SIGNED IN INK BY AN AUTHORIZED REPRESENTATIVE OF THE PROPOSER; ANY ALTERATIONS OR ERASURES TO THE PROPOSAL MUST BE INITIALED IN INK BY THE UNDERSIGNED AUTHORIZED REPRESENTATIVE.

The undersigned acknowledges, attests and certifies individually and on behalf of the Proposer that:

A. He/she is a duly authorized representative of the Proposer, has been authorized by Proposer to make all representations, attestations, and certifications contained in this Proposal and all Addenda, if any, issued.

B. Proposer, acting through its authorized representatives, has read and understands all RFP instructions, terms and conditions, Product Requirements and Technical Specifications contained in this RFP document (including all listed attachments and Addenda, if any, issued);

C. The Proposal submitted is in response to the specific language contained in the RFP, and Proposer has made no assumptions based upon either (a) verbal or written statements not contained in the RFP, or (b) any previously-issued RFPs, if any.

D. WPRD shall not be liable for any claims or be subject to any defenses asserted by Proposer based upon, resulting from, or related to, Proposer’s failure to comprehend all requirements of the RFP.

E. WPRD shall not be liable for any expenses incurred by Proposer in preparing and submitting its Proposal or in participating in the Proposal evaluation/selection process.

F. The Proposal was prepared independently from all other Proposers, and without collusion, fraud, or other dishonesty.

G. Proposer is bound by and will comply with all requirements and terms and conditions contained in this Proposal (including all listed attachments and Addenda, if any, issued);

H. Proposer will furnish the designated item(s) and/or service(s) in accordance with the RFP requirements, and will comply in all respects with the terms of the resulting contract upon award;

I. Proposer represents and warrants that Proposer has the power and authority to enter into and perform the contract and that the Contractor, when executed and delivered, shall be a valid and binding obligation of Contractor enforceable in accordance with its terms; and

J. All affirmations and certifications contained herein in Exhibit C, Proposer Certifications, are true and correct.

____________________________________________________________________
Signature of Authorized Representative      Date

____________________________________________________________________
Name of Firm

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EXHIBIT F

Standard Proposal Form

Proposal Submitted By:

Name: ___________________________ Title: ___________________________

Signature: ______________________ Date: ___________________________

Company Name: ___________________________

Address: ___________________________

Phone: ___________________________ Fax: ___________________________

Email Address: ___________________________ Federal Tax ID #: __________

Company contact for this project (if different from above):

Name: ___________________________ Title: ___________________________

Phone: ___________________________ Email Address: ___________________________

Oregon Department of Agriculture Pesticide License #: ___________________________

Expiration Date: ___________________________
This Independent Contractor Agreement ("Agreement") is made by and between Willamalane Park and Recreation District ("WPRD") and Company A, ("Contractor") according to the following terms, conditions, and provisions:

1. **Identity of Contractor.**
   - **Name:**
   - **Type of Entity:**
     - [ ] Sole Proprietorship
     - [ ] Partnership
     - [ ] Corporation, Non-Profit
     - [ ] Limited Liability Company
   - **Address:**
   - **City, State, Zip:**
   - **Business Telephone:**
   - **Business Fax:**
   - **Social Security #:**
   - **Federal I.D. #:**
   - **Oregon Tax I.D. #:**

2. **Job to Be Performed.** Contractor shall implement filbert orchard management services at Dorris Ranch.

3. **Scope of Work.** The Contractor shall provide filbert orchard management services at Dorris Ranch, as particularly described in the Scope of Work ("Work") identified in Exhibit A and incorporated herein by reference.

4. **Work Performed.** The Work comprises services generally performed by Contractor in its usual line of business as well as any other Work specifically identified. In providing the services under this Agreement, Contractor agrees to meet the standards prevalent in the industry.

5. **General.** WPRD has need for the services of an independent Contractor with the particular training, ability, knowledge, expertise and experience possessed by the Contractor. The Contractor shall furnish all qualified personnel, facilities, materials, equipment, supplies, and other services necessary to perform the Work. The Contractor’s project team is identified in Contractor’s Proposal dated _________. The Contractor shall not change any of the project team members identified as key members without WPRD’s prior written consent, with the exception of an unforeseen circumstance such as death, termination of employment or retirement. Furthermore, the Contractor shall provide timely written notice, defined for this
purpose as not less than three (3) business days, to WPRD of any other changes to the project team during the project.

6. **Contract Term.** The term of this Agreement shall commence on the date the Agreement is signed by both parties ("Effective Date") and shall terminate three (3) years from the Effective Date, or otherwise in accordance with the terms and conditions of this Agreement. WPRD may extend the term of this Agreement for up to two (2) separate one-year terms, by delivering written notice of its intent to extend the Agreement to the Contractor at least 30 calendar days prior to the end of the then current Agreement term.

7. **Compensation.** As full consideration for the satisfactory performance by Contractor of Work prescribed under the Agreement, WPRD will pay contractor according to the terms set forth in Section 2.01 of the RFP.

8. **Additional Work.** In the event WPRD determines the scope of Work must be modified during the project, the parties shall engage in good faith negotiations in order to agree on a supplemental scope of Work and this Agreement will be amended according to Section 27. The Contractor agrees to provide all such additional services at the rates identified in Contractor’s Proposer for the duration of this Agreement.

9. **Status.** While performing the Work, Contractor is at all times acting and performing as an Independent Contractor and not as an employee, officer or agent of WPRD, as those terms are used or defined in ORS 30.260 and 30.265. No agent, employee, officer or servant of Contractor is an employee, agent, officer or servant of WPRD. WPRD is interested only in the results obtained under this Agreement; the manner and means of conducting the Work are under the sole control of Contractor. However, the Work must meet the approval of WPRD and is subject to the WPRD's general right of inspection and supervision to secure satisfactory performance of the Work.

10. **Notice To Contractor Regarding Its Tax Duties And Liabilities.** Neither federal, nor state, nor local income tax nor payroll tax of any kind will be withheld or paid by WPRD on behalf of Contractor or the employees of Contractor. Contractor understands that it is responsible to pay, according to law, all of Contractor’s taxes regardless of type. If Contractor is not a corporation, Contractor further understands that it may be liable for self-employment (Social Security) tax, to be paid by Contractor according to law.

11. **Reimbursement of Expenses.** WPRD is not liable to Contractor for any expenses paid or incurred by Contractor unless otherwise agreed in writing.

12. **Equipment, Tools, Materials or Supplies.** Contractor shall supply necessary materials, equipment, tools and supplies to accomplish the Work.

13. **No Authority to Bind WPRD.** Contractor has no authority to enter into contracts on behalf of WPRD, its officers, agents and/or employees. This Agreement does not
create a partnership or any other relationship other than a contractual owner and Contractor relationship between the parties.

14. **Federal Employment Status.** In the event payment made pursuant to this Agreement is to be charged against federal funds, Contractor certifies that it is not currently barred from working on federally funded projects nor is it employed by the federal government. Furthermore, the amount charged does not exceed Contractor’s normal charge for the type of services provided.

15. **Indemnification, Defense and Hold Harmless.** To the maximum extent permitted by law, Contractor shall indemnify, defend, and hold harmless WPRD, its agents, servants and employees from and against all loss, expense, claims, demands or liability whatsoever (including attorney fees and costs at arbitration, trial and/or appeal) for bodily injury or death to any person, or injury to property arising out of the negligent performance of this Agreement. WPRD agrees to promptly notify Contractor in writing of any such claim or demand to indemnify, defend and/or hold harmless and agrees to cooperate with Contractor in a reasonable manner to facilitate the defense of such claim.

16. **Dispute Resolution.** Contractor shall refer questions regarding the meaning and intent of this Agreement, and any exhibits thereto, in writing to the Project Manager for the Project Manager’s decision. The Project Manager shall respond to the Contractor in writing with its decision. If the Contractor disagrees with the Project Manager’s decision, Contractor may appeal the decision to WPRD. Any related Work performed by the Contractor prior to the Project Manager’s decision is done at Contractor’s risk unless authorized by the Project Manager. The Project Manager will not consider direct questions from subcontractors, suppliers, manufacturers, or others not a party to this Contract.

In the event the Contractor disagrees with any such decision of the Project Manager, the Contractor may, within ten (10) days of the date of such decision, appeal the decision to WPRD for review. The appeal must be in writing and must set forth the question referred to the Project Manager, the Project Manager’s decision and the Contractor’s basis for disagreement. Contractor shall deliver a copy of the appeal to the Project Manager at the time it is filed with WPRD. WPRD shall make all reasonable efforts to review the appeal and deliver its decision in writing to the Contractor within thirty (30) days from the date of receipt of the appeal. Failure of the Contractor to appeal the decision of the Project Manager within said 10-day period constitutes a waiver of the Contractor’s right to thereafter assert any claim resulting from such decision. This procedure is not meant to preclude or discourage informal resolution of disagreements between the Project Manager and the Contractor.

In the event WPRD elects to do so, WPRD may establish a “Claims Review Board” either to assist in reviewing appeals hereunder or to consider Contractor appeals directly. Once established, this Review Board will hear all future appeals of claims for this Contract.
During the pendency of any appeal, any related Work performed by the Contractor shall be done at its risk unless authorized by the Project Manager.

Except as otherwise provided in this Agreement, any controversy, claim, or dispute arising out of or relating to the Agreement, or the breach thereof, must be resolved by arbitration in accordance with the Oregon Uniform Arbitration Act and the terms herein. Where a conflict exists between the terms herein and the Oregon Uniform Arbitration Act, the terms herein supersede to the extent allowed by law. A decision by two of the three arbitrators shall be final and binding, and judgment may be entered thereon.

The Contractor shall not delay the Work because arbitration or other legal proceedings are pending, unless they have written permission from the Project Manager to do so. Such delay is limited to the time required by the arbitrators or court to determine whether the Work will continue or be suspended pending decision on the dispute by the arbitrators or court. Any request for arbitration must be in writing and must be delivered to WPRD and Project Manager and any adverse party either by personal delivery or by registered mail addressed to the last known address of the parties in dispute.

In the event WPRD or Contractor initiates arbitration, WPRD shall pay all fees and costs associated with arbitration.

Each party shall appoint an arbitrator, with the third arbitrator selected by the two party-chosen arbitrators. Once one party has asked for arbitration and appointed an arbitrator, the other party must select an arbitrator within sixty (60) days. In the event the second party fails to appoint an arbitrator within this time, the arbitrator appointed by the first party shall serve as the sole arbitrator. In the event the two party-chosen arbitrators are unable to select a third arbitrator within thirty (30) days after the two party-chosen arbitrators have been selected, the two-party chosen arbitrators shall apply to the then-Presiding Judge of Lane County Circuit Court for selection of a third arbitrator who meets the qualifications set forth in this section.

All arbitrators shall be unaffiliated with either party and shall be an active member in good standing with the Oregon State Bar.

The prevailing party in such arbitration is entitled to recover fees and costs paid to the arbitrator, if any, and the prevailing party’s reasonable attorney’s fees and costs therein.

The parties hereby stipulate and consent that venue for all arbitration or other legal actions arising under the Agreement is in Lane County, Oregon, and that jurisdiction for all legal actions that are brought in or transferred to court is in the Circuit Court of the State of Oregon; except, if a claim must be brought in a federal forum, then it must be brought and adjudicated solely and exclusively in the United States District Court for the District of Oregon located in Eugene, Oregon.
17. **Attorney Fees.** In the event an arbitration award confirmed or vacated by a court is appealed, or in the event the arbitration provision in Section 17 is held by a court to be invalid, does not apply, or is waived by the parties, and a legal action relating to the Agreement, or the breach thereof, is brought by either party, the prevailing party shall be entitled to recover from the other party reasonable attorney’s fees and costs therein and in any appeal therefrom.

18. **Insurance.** The Contractor shall obtain, and maintain continuously for the term of this contract, at its own expense:

   a. **Workers’ Compensation Insurance.** Workers’ compensation insurance in compliance with ORS 656.017. All employers, including the Contractor, that employ subject workers who work under this Contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers’ Compensation coverage, unless such employees are exempt under ORS 656.127. The Contractor shall ensure that each of its subcontractors complies with these requirements. Contact Willamalane Risk Management at 541-736-4544 if exempt.

   b. **Commercial General Liability Insurance.** Commercial General Liability/Professional Liability/Errors & Omissions. Contractor and all of its subcontractors shall at all times carry a General Liability/Professional Liability/Errors and Omissions type insurance policy with limits of not less than $2,000,000 each occurrence (or each claim if coverage is afforded on a claims made basis) and $4,000,000 in the annual aggregate. If this policy is a “claims made” type policy, the policy type and company shall be approved by WPRD prior to commencement of the Work.

   c. **Notice of cancellation or change.** There shall be no cancellation, material change, reduction of limits or intent not to renew the insurance coverage(s) without 30 days written notice from the Contractor or its insurer(s) to WPRD. This notice provision shall be by endorsement physically attached to the certificate of insurance.

   d. **Additional Insured.** For general liability insurance, WPRD and its agents, officers, and employees will be Additional Insureds, but only with respect to the Contractor’s services provided under this contract. This coverage shall be by endorsement physically attached to the certificate of insurance.

   e. **Professional Liability/Errors and Omissions Insurance.** The Contractor shall carry Professional Liability insurance with limits not less than $2,000,000 and provide WPRD with evidence of such coverage.

   f. **Certificates of Insurance.** Contractor shall furnish insurance certificates acceptable to WPRD prior to commencing the Work. The certificate will
include the deductible or retention level and required endorsements. Insuring companies or entities are subject to WPRD approval. If requested, copies of insurance policies shall be provided to WPRD. Contractor shall be responsible for all deductibles, self-insured retention’s, and/or self-insurance.

g. **Extended Reporting Coverage ("Tail Coverage").** Tail coverage extends the time for filing claims under a “claims made” policy beyond the term of the policy for wrongful acts that occurred within the term of the “claims made” policy. “Claims made” policy means that any claim under the policy must be reported during the policy period.

For Professional Liability/Errors & Omissions Insurance written on a “claims made” basis and for any other required liability insurance provided on a “claims made” basis, Contractor shall provide “tail” coverage at the completion of the Agreement for a duration of thirty-six (36) months or continuous “claims made” liability coverage provided for thirty-six (36) months following the Agreement completion. Continuous “claims made” coverage will be acceptable in lieu of “tail” coverage provided the retroactive date of the coverage is on or before the effective date of this Agreement.

h. **Maximum Deductible/Self-Retention.** Any deductible or self-retention must be disclosed on the certificate of insurance and no deductible or retention may exceed $25,000 without the prior written consent of WPRD.

i. **Insurance Certificates.** Contractor and all subcontractors shall deliver to WPRD, prior to the commencement of the Work, a certificate of insurance or the actual insurance policy/policies evidencing all policies required by this Agreement. Either the certificates of insurance or the policies shall contain the promise of the insurer to give WPRD written notice at least thirty (30) calendar days prior to the effective date of any lapse, cancellation, non-renewal or material reduction in any of the required coverages. In the event the insurer cannot or will not provide such written notice to WPRD, Contractor has an affirmative duty to provide the notice of lapse, cancellation, and non-renewal or material reduction to WPRD within 24 hours of the Contractor receiving such notice itself. WPRD has the right to reject any certificate and/or policy if WPRD in its sole discretion determines that either the coverage or the insurance company is unacceptable. Evidence of continuous coverage is required, including renewal certificates for any policies that renew during the project.

j. **Subcontractor Insurance.** The Contractor shall require that all of its subcontractors of any tier provide insurance coverage and limits identical to the insurance required of the Contractor under the Agreement, unless this requirement is expressly waived in writing by WPRD. The sufficiency of subcontractor insurance and coverage limits is subject to WPRD’s approval and must be shown by appropriate insurance certificates in a form acceptable to WPRD.
k. **Primary Coverage.** All insurance carried by the Contractor or a subcontractor required by this Agreement must be primary to and non-contributory with any insurance carried by the WPRD or self-insurance of the WPRD. Any insurance held by the WPRD is excess and solely for damages or losses for which WPRD is responsible.

19. **Termination.**

a. The performance of the Work may be terminated by WPRD, in whole or in part, whenever and for any reason WPRD determines that such termination is in the best interest of WPRD. Any such termination is effective upon delivery to the Contractor of a Notice of Termination specifying the extent to which performance of the Work is terminated and the date on which such termination becomes effective.

b. Upon delivery to the Contractor of a Notice of Termination under this Section, the Contractor and WPRD shall attempt to negotiate an appropriate written modification to the Agreement governing Contractor’s completion of the portion of the Work designated by WPRD and payment therefore by WPRD. If the parties cannot reach agreement within twenty (20) calendar days, WPRD’s liability to Contractor will not exceed the amount that would be due on a progress billing for uncompensated Work performed prior to the designated termination date.

20. **Assignment/Subcontract.** Contractor shall not assign, sell, transfer, subcontract or sublet rights, or delegate responsibilities under this Agreement, in whole or in part, without the prior written approval of WPRD. No such written approval relieves Contractor of any obligations under this Agreement, and any transferee or sub-Contractor is considered the agent of Contractor. Contractor remains liable as between the original parties to the Agreement as if no such assignment had occurred.

21. **Successors In Interest.** The provisions of this Agreement are binding upon and inure to the benefit of the parties to the Agreement and their respective successors and assigns.

22. **Compliance With All Government Regulations.** Contractor shall comply with all federal, state and local laws, codes, regulations and ordinances applicable to the Work. Failure to comply with such requirements constitutes a breach of this Agreement and is grounds for termination of this Agreement. Damages or costs resulting from noncompliance are the sole responsibility of Contractor and its subcontractors.

23. **Force Majeure.** Neither party to this Agreement is responsible for delay or default caused by fire, riot, acts of God and/or war that is beyond that party’s reasonable control. WPRD may terminate this Agreement upon written notice after determining such delay or default will reasonably prevent successful performance of the Agreement.
24. **Severability.** If any provision of this Agreement is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provision are not affected; and the rights and obligations of the parties are construed and enforced as if the Agreement did not contain the particular provision held to be invalid.

25. **Access to Records.** Contractor shall permit WPRD and its duly authorized representatives access to books, documents, papers and records of Contractor that are related to this Agreement for the purpose of making audits, examinations, excerpts and transcripts. Contractor shall maintain the records and make them available to WPRD until a date that is not less than seven (7) years after the date of the last payment made by WPRD under this Agreement.

26. **Waiver.** Failure of WPRD to enforce any provision of this Agreement does not constitute a waiver or relinquishment by WPRD of the right to such performance in the future nor of the right to enforce any other provision of this Agreement.

27. **Amendments.** The terms of this Agreement may not be waived, altered, modified, supplemented or amended in any manner whatsoever, except upon written amendment approved by WPRD.

28. **Nondiscrimination.** Contractor shall comply with all applicable requirements of federal, state and local civil rights and rehabilitation statutes, rules and regulations.

29. **Dual Payment.** Contractor is not entitled to compensation for Work performed under this Agreement from any party other than WPRD.

30. **Remedies.** The rights and remedies provided in Section 19 (Termination) are not exclusive, and are in addition to any other rights and remedies provided by law or under this Agreement. Termination of this Agreement pursuant to Section 20 is without prejudice to any obligations or liabilities of either party already accrued prior to such termination.
31. Conditions Concerning Working Conditions and Payment

a. Contractor must give notice in writing to employees who work on a public contract either at the time of hire or before commencement of Work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that the employees may be required to work.

b. No person, unless exempted by ORS 656.126, may be employed under this Agreement for more than 10 hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, and in such cases Contractor shall pay the laborer at least time and a half pay for all overtime in excess of eight hours in any one day or 40 hours in any one week when the work week is five consecutive days, Monday through Friday; or for all overtime in excess of 10 hours in any one day or 40 hours in any one week when the work week is four consecutive days, Monday through Friday; and for Work performed on Saturday and on any legal holiday specified in ORS 279B.020 and/or 279C.540.

c. Contractor must comply with ORS 656.017 or be exempt under ORS 656.126.

d. As required by Oregon law, Contractor shall:

i. Make payment promptly, as due, to all persons supplying Contractor with labor or material for the prosecution of the Work.

ii. Pay all contributions or amounts due the Industrial Accident Fund from Contractor incurred in the performance of the Work.

iii. Not permit any lien or claim to be filed or prosecuted against WPRD on account of any labor, equipment, supplies and/or material furnished. In the event a lien is filed, then Contractor shall remove the lien within five (5) business days either by sufficient payment to the lien claimant or by “bonding off” the lien.

iv. Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

v. Promptly, as due, make payment to any person, co-partnership, association or corporation, furnishing medical, surgical and hospital care services or other needed care and attention, incident to sickness or injury, to the employees of Contractor, of all sums that Contractor agrees to pay for such services and all monies and sums that Contractor collected or deducted from the wages of employees pursuant to law, contract or agreement for the purpose of providing or paying for such service.
e. If Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to Contractor by any person in connection with this Agreement as such claim becomes due, the proper officer or officers representing WPRD may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due to Contractor by reason of this Agreement.

32. **Governing Law.** The laws of the State of Oregon (without giving effect to its conflicts of law principles) govern all matters arising out of or relating to this Agreement.

33. **Notice.** Whenever it is necessary to give notice to a party under this Agreement, including submittal of invoices, payments, and deliverables, the notice is effective when the party either (a) delivers the notice personally, (b) sends it by facsimile transmission (including email or other project-adopted means of electronic communication), or (c) sends it via U.S. Mail or parcel delivery service, shipping prepaid, and addressed to the other at:

Contractor:

WPRD:

34. **Survival.** Sections 16-19, 25, 26, 33, and this Section 35 survive termination of this Agreement.

35. **Entire Agreement.** This Agreement signed by both parties along with all Exhibits incorporated herein is the parties’ final and entire agreement and supersedes all prior and contemporaneous oral or written communications between the parties, their agents and representatives. There are no representations, promises, terms, conditions or obligations other than those contained herein.

IN WITNESS WHEREOF, we, the parties hereto, each herewith subscribe the same on the dates set forth below.

WPRD: CONTRACTOR:

By: ___________________________  By: ___________________________

*Michael Wargo, Superintendent*

Title: __________________________

Date: _________________  Date: _________________